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Feasibility of Using the MIRADS Data Management  
System for a State Air Pollution Agency

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# Center for Environmental and Energy Studies

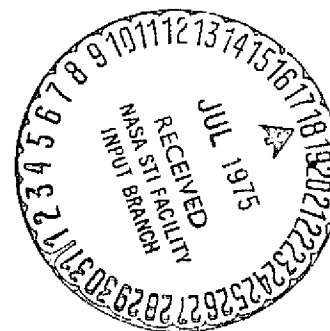
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The University  
Of Alabama  
In Huntsville

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June 25, 1975



Feasibility of Using the MIRADS Data Management  
System for a State Air Pollution Agency

Contract NAS8-30885

Prepared for

National Aeronautics and Space Administration  
George C. Marshall Space Flight Center  
Marshall Space Flight Center, Alabama 35812

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June 25, 1975

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## ABSTRACT

MIRADS is a generalized data management system developed by the National Aeronautics and Space Administration's George C. Marshall Space Flight Center. This report presents the feasibility of using MIRADS by the State of Alabama Air Pollution Control Commission. The State's Enforcement Management System and the Emission Inventory System were implemented into MIRADS.

## INTRODUCTION

Data processing is a big business. A recent survey has estimated the total 1974 data processing expenditures to be over \$28 billion.<sup>1</sup> A pie chart illustrating the breakdown of these expenditures is given in Figure 1. Looking at this figure, approximately 39% is spent for hardware (i.e., the computer, terminals, etc.), while the remaining 71% is spent for software. In the United States alone, it has been estimated that the 1974 annual software costs were over \$10 billion,<sup>2</sup> which is more than one percent of the gross national product. To exemplify the costs of software, the Air Force FY1972 expenditure on software was between \$1 billion and \$1.5 billion - about three times the annual expenditure on computer hardware and about 4 to 5 % of their total budget.<sup>2</sup> A recent estimate for NASA was an annual expenditure of \$100 million for hardware and \$200 million for software - about 6% of their annual budget. Other specific examples of software costs are \$200 million for the IBM 360 operating system<sup>3</sup> and \$1 billion for the Manned Space Program software between 1960 and 1970.<sup>4</sup>

On the brighter side, the new advances in computer technology are causing significant reductions in hardware costs. For example, in 1950 35,000 computer instructions could be processed for one dollar. In the late 1960, using third generation hardware, one dollar would process 35 million instructions. While hardware costs are decreasing, software costs are increasing - in fact, increasing rapidly. One source<sup>2</sup> has estimated software costs by 1985 to be over 90% of the total data processing costs.

A possible solution to these spiraling software costs is the development of general purpose systems which can be readily adapted to other application areas. Information systems are one of these general purpose systems. With the advent of third generation computers in the 1960's, a variety of information systems have been developed. Much has been said and written concerning information systems.

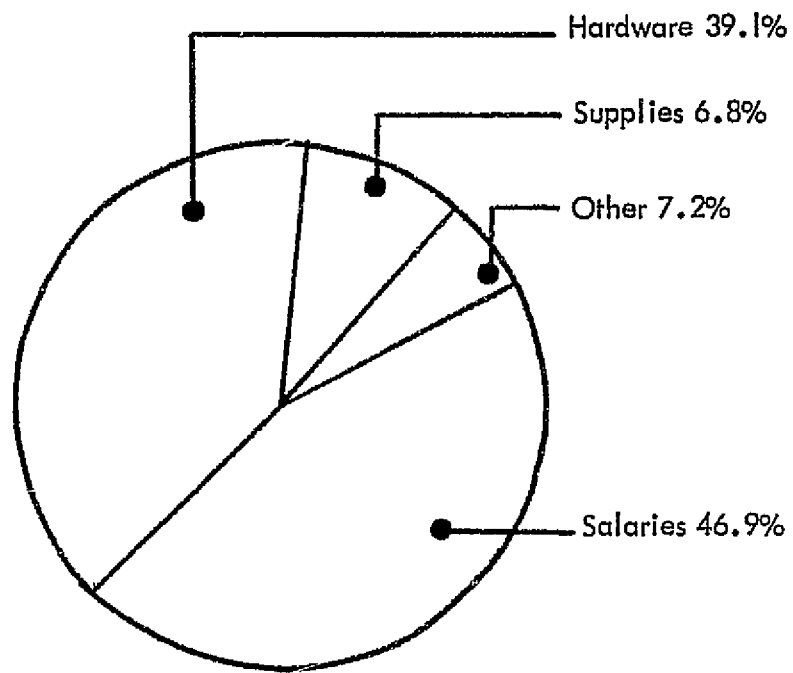


Figure 1. Distribution of Expenditures

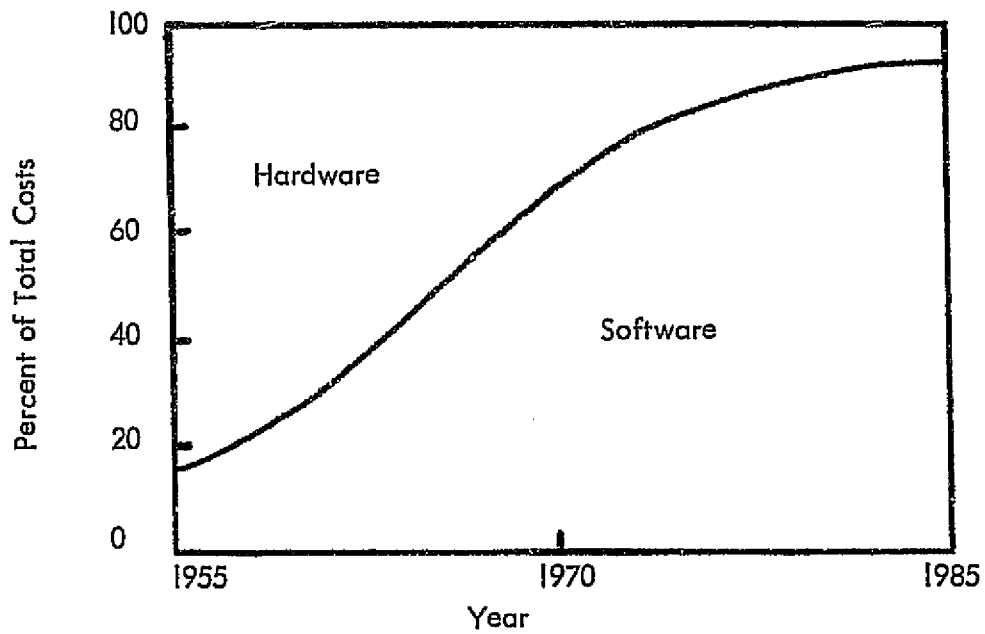


Figure 2. Hardware/Software Cost Trends

In fact, in many instances the term information system is not even used. Instead, it is replaced by such terms as information management system, management information system, total system, and integrated system. In the past several years a new term, data management, has also been added to this list.

The present status of information systems is that almost every computer manufacturer has such a system. Also, most of the large computer users have developed, in one form or another, at least one type of information system. The Computation Laboratory at NASA's George C. Marshall Space Flight Center (MSFC) has also developed such a generalized information system: a data management system called MIRADS (Marshall Information Retrieval and Display System). Since its inception in 1967, over 30 man years have been expended in its development. The system became operational in 1971. Since then a staff of analysts/programmers has been retained for user assistance, system refinements, and debugging. The popularity of the system with MSFC is evident by the number of organizations presently having the system operational and by the variety of user applications which have been and are being implemented on MIRADS. Some of these MSFC applications<sup>5</sup> are a medical data system, an inventory control system, a personnel talent bank, a task management system, a telephone cabling system, and an earth resources data system.

With all these successful applications at MSFC, it appears that such a system may also have benefit outside the federal government. One such possible area of spin-off would be on a state level, namely the area of air pollution. The Alabama Air Pollution Control Commission (AAPCC) was one of the first states to implement the following computer systems: The Enforcement Management System (EMS), The Air Quality Data Handling System (AQDHS), and the Emission Inventory System (EIS). All three of these systems operate in a batch environment. That is, data is collected during the month, keypunched, and the data bases updated at the end of the month. After the update cycle, each system generates a variety of management reports. Although these batch reports satisfy a specific requirement,



there are many other one-of-a-kind information requests that occur which cannot be readily answered by referencing the batch reports. Many of these requests are from other state and local agencies, companies, and private citizens throughout the state. These are unique requests generally requiring a real-time response.

In an attempt to satisfy these types of information requests, the MIRADS system was investigated in terms of its systems feasibility. Both the technical and the economical aspects of using the MIRADS system were investigated. Special focus was made on the economic aspects since a major requirement of such a system is that it is cost effective. This report presents the results of the study to determine the feasibility of using MIRADS for retrieving data from the EMS and the EIS systems. Included in this report are a description of each of the systems, a description of MIRADS, some of the modifications made to the MIRADS system, a representative sample of some of the inquiries asked of the systems, and the results of the economical analysis.

## ENFORCEMENT MANAGEMENT SYSTEM

As stated in the Alabama Air Pollution Control Act, "Before any article, machine, equipment, or other contrivance . . . may be operated or used, a written permit shall be obtained . . . ." Based on this legislation the AAPCC has implemented a permit system for all sources of air pollution in the State. This permit system is being used as the mechanism for enforcing the State's air pollution rules and regulations. All sources in the State have been notified and given instructions for completing the permit application forms. The permit system uses six forms. A Facility Identification Form must be completed for each source. Depending on the air contaminant source, either an Indirect Heating Equipment Form, a Manufacturing or Processing Equipment Form, or a Refuse Disposal Form must be completed. For any air contaminant source which has a gas cleaning device installed, a Data Sheet for Gas Cleaning Devices must be completed. In addition, each source which is not in compliance with the applicable rules and regulations must also submit a Compliance Schedule.

The Enforcement Management System<sup>6,7</sup> provides the methodology for the AAPCC to control its enforcement activities. The system emphasizes management control of the enforcement function and establishes standardized methods of handling data. The system can be considered as cyclical in nature, in that the AAPCC's actions with a source occur repeatedly over time, one step leading to the next. The system tracks and monitors these steps and then updates the necessary schedules and reports. It produces a variety of reports and summaries to meet the needs of the various staff members.

An overview of the operation of the system is given in Figure 3. Inputs received by the AAPCC, which are processed by the EMS system, consist of the permit application forms, complaint letters, and various information requests. In addition to these inputs, there are four local air pollution control agencies which are responsible for enforcing the State's rules and regulations in their

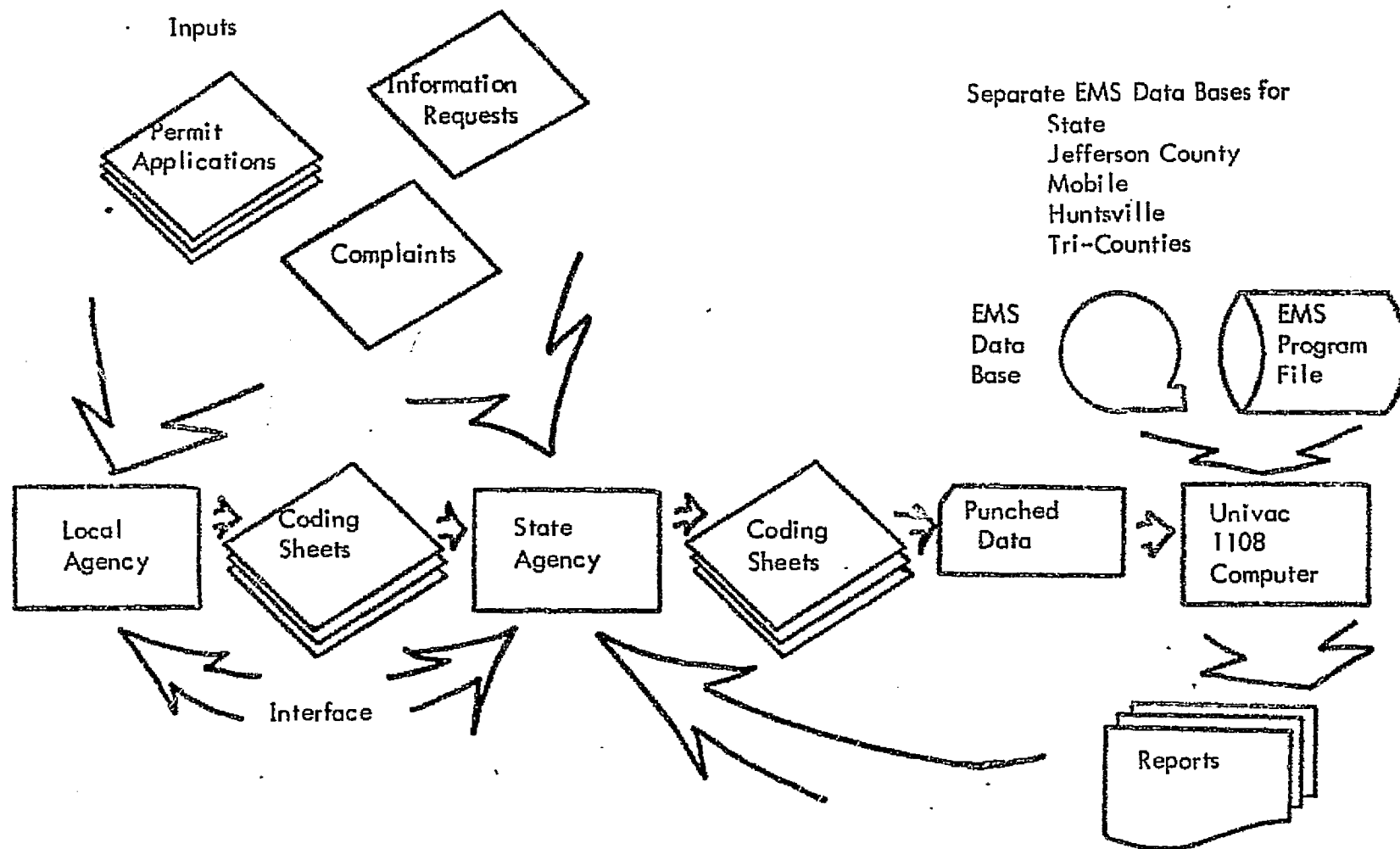


Figure 3. EMS System Overview

specific locales.

The types of data which are entered into the EMS system can generally be classified as management data. The data base consists of the following six record types: Source Identification Record, Source Comments Record, Permit Record, Permit Comments Record, Permit Action Record, and Permit Action Comments Record. The specific data base elements are given in Appendix A.

The system is updated monthly. After each update, the following reports are generated: the Source Registration Report, the Source Action Summary Report, the Action Summary Report, the Future Schedule Summary Report, and the Overdue Action Report. The source registration report lists the basic source data collected from the registration activities, the emission inventory, and the permit applications. The data are grouped by source to show general company data followed by specific data concerning the emission points at that company. A page from this report is given in Figure 4. The source action summary lists all the actions against a specific source. The actions are listed by emission point to show the current status of the enforcement activities. A page from this report is given in Figure 5. The action summary lists all the actions which have been performed by staff members during a specified time period. The future schedule summary lists all actions which are scheduled in the future. The overdue action report lists all actions which are overdue based on their scheduled date.

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SOURCE REGISTRATION REPORT

ENFORCEMENT MANAGEMENT SYSTEM  
STATE

PAGE 225

01/31/73  
SWIFT AGRICULTURAL CHEM.  
REGION 06  
COUNTY 07  
FACIL. 0007

FACILITY NAME SWIFT AGRICULTURAL CHEM  
FACIL LOCATION 1401 E. BURDESHAW ST  
DOTHAN

CONTACT KEARNS  
TELEPHONE 312 4312230  
MAILING 111 W. JACKSON BLVD.  
ADDRESS CHICAGO IL 60604

GRID COORD BY  
INSPECTOR  
ENGINEER POI BARRETT

SIC CODE 2871  
DESCRIPTION MFR. OF MIXED FERTILIZE  
COMMENTS MANUFACTURE OF MIXED FERTILIZERS AND SULFURIC ACID.  
SEVERAL COMPLAINTS HAVE BEEN LODGED AGAINST SWIFT.  
PLANT VISIT WAS MADE 5-18-72.

PERMIT NUMBER A000  
DESCRIPTION ENTIRE SOURCE  
CONTROL DEVICE

POLLUTANTS

PERMIT NUMBER W001  
DESCRIPTION SINGLE SUPERPHOSPHATE MFR  
CONTROL DEVICE WET SCRUBBER  
COMMENTS BAG HOUSE TO BE INSTALLED. FINAL  
DATE OF COMPLIANCE IS MAY 7, 1973.  
INTERMEDIATE REPORTING DATES ARE  
FEB. 15, 1973 AND MAY 7, 1973.

POLLUTANTS PARTICULATES

PERMIT NUMBER W002  
DESCRIPTION SULFURIC ACID PLANT  
CONTROL DEVICE NONE  
COMMENTS FINAL DATE OF COMPLIANCE IS  
JAN. 18, 1975. INTERMEDIATE REPORTS  
ARE DUE JUNE 30, 1973; SEPT. 30, 1973  
DEC. 30, 1973; MARCH 30, 1974;  
JUNE 30, 1974; SEPT. 30, 1974;  
DEC. 30, 1974; JAN. 18, 1975.

POLLUTANTS SO2, SO3

PERMIT NUMBER Z003  
DESCRIPTION GRANULATION+AMMONIATION  
CONTROL DEVICE WET SCRUBBER  
COMMENTS WATER SPRAYS ARE UTILIZED TO REDUCE  
FUGITIVE DUST. STACK TESTS WERE RUN  
AUG. 1972 TO PROVE COMPLIANCE.

POLLUTANTS PARTICULATES

Figure 4. EMS Source Registration Report

# SOURCE ACTION SUMMARY

01/31/73

ENFORCEMENT MANAGEMENT SYSTEM  
STATE

PAGE 226

REGION 06  
COUNTY 07

SWIFT AGRICULTURAL CHEM.  
1901 E. BURDESHAW ST  
GOTHAM

FACILITY-NO. GRID LOCATION FACILITY DESCRIPTION  
0007 BY MFR. OF MIXED FERTILIZERS

PERMIT NO.	DESCRIPTION	ACTION	ACTION	DATE SCHEDULED	DATE PERFORMED	STAFF MEMBER	SECTION	HRS TO LETTER CHPLTE CODE
6	A000	ENTIRE SOURCE						
	W001	SINGLE SUPERPHOSPHATE MFR						
		01	PLAN REVIEW COMMENTS	02/15/73	11/06/72	BARRETT	ENGINEERING	01
		FUTURE	02	PERIODIC REPORT	02/15/73	/ /	BARRETT	ENGINEERING 07
	W002	SULFURIC ACID PLANT						
		01	PLAN REVIEW	00/00/00	10/16/72	BARRETT	ENGINEERING	01
		02	PERIODIC REPORT	00/00/00	/ /	BARRETT	ENGINEERING	07
	7003	GRANULATION+AMMONIATION						
		01	PLAN REVIEW COMMENTS	00/00/00	09/12/72	BARRETT	ENGINEERING	00
		02	OTHER	00/00/00	/ /	BARRETT	ENGINEERING	06

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Figure 5. EMS Source Action Summary

## EMISSION INVENTORY SYSTEM DESCRIPTION

Pollution of the atmosphere has become an undesired by-product of the technological advancement of modern society. The initial step to improve the air pollution situation is to define the problem areas. A primary requirement is the determination of the sources and components of air pollution. This requirement is provided for by the emission inventory. The emission inventory provides information concerning source emissions and defines the location, magnitude, frequency duration, and relative contribution of these emissions. These data, coupled with local meteorological and air quality data and information regarding air pollution effects, provides the basis for a plan of action for improvement of air quality. The emission inventory is therefore a vital element in the abatement of emissions and in subsequent improvements in air quality.

Because it defines the sources of air pollution, the emission inventory is one of the most important planning tools available to an air pollution control agency. It can be used to measure past successes and to point to future requirements. An emission inventory can be used to design an air sampling network, to predict ambient air quality, to design, evaluate, or modify a control program, and, in conjunction with a permit or registration system (Reference the Enforcement Management System), to provide up-to-date information on major sources of pollution.

The proper emission control strategy for a specific air pollution problem is dependent upon an adequate assessment of the nature and extent of the pollution in the region involved. This assessment includes a review of existing levels of pollutants, the sources, and their emissions, the techniques available for their control, and the probable increase in source emissions resulting from urban and economic growth. The emission inventory indicates the major contributors (motor vehicle, industrial, etc.). This information, in turn, directs the thrust of the control efforts. After the control strategies have been developed, they can be tested with the aid of a diffusion simulation model or other systematic, quantitative procedures to determine which strategies are capable of bringing about acceptable air quality as defined by national or state ambient air quality standards.

If the emission inventory is updated annually, a decrease in emissions should be reflected over a period of years. This decrease would then be a measure of the effectiveness and success of the control program and could be used to indicate areas where program modification would be useful. Likewise, in the design of an air sampling network, it is important to get maximum return in usable data for the manpower and funds invested. Information concerning the location of sources and quantities of emissions in a region may be used to indicate where the highest pollutant concentrations probably exist. This knowledge will assist the agency in locating elements of the sampling network. Samplers are normally concentrated in areas of greatest emissions. In the event that a single source is believed to be primarily responsible for degraded air quality, the sampling network may be oriented in such a way that evidence of the impact of the emissions from that particular source may be obtained.

The emission inventory may be used with sufficient supporting meteorological data to predict ambient air quality for a given locality. From emission density maps, areas with high pollutant releases can be located. A more sophisticated method of predicting air quality is diffusion modeling. Included among the models in widespread use are the Air Quality Model (AQDM) and the Implementation Planning Program (IPP).

An overview of the operation of the EIS system<sup>8, 9, 10</sup> is given in Figure 6. Inputs to the system consists of the results of the emission inventories either conducted by the State or a local air pollution agency. These inputs are received on two standard coding forms: an area source coding form and a point source coding form. The specific data elements on each of these forms are given in Appendix A. The system is updated after each newly conducted emission inventory, which is generally once a year. After each update cycle, a new emission inventory report is generated. A page from this report is given in Figure 7.



Inputs

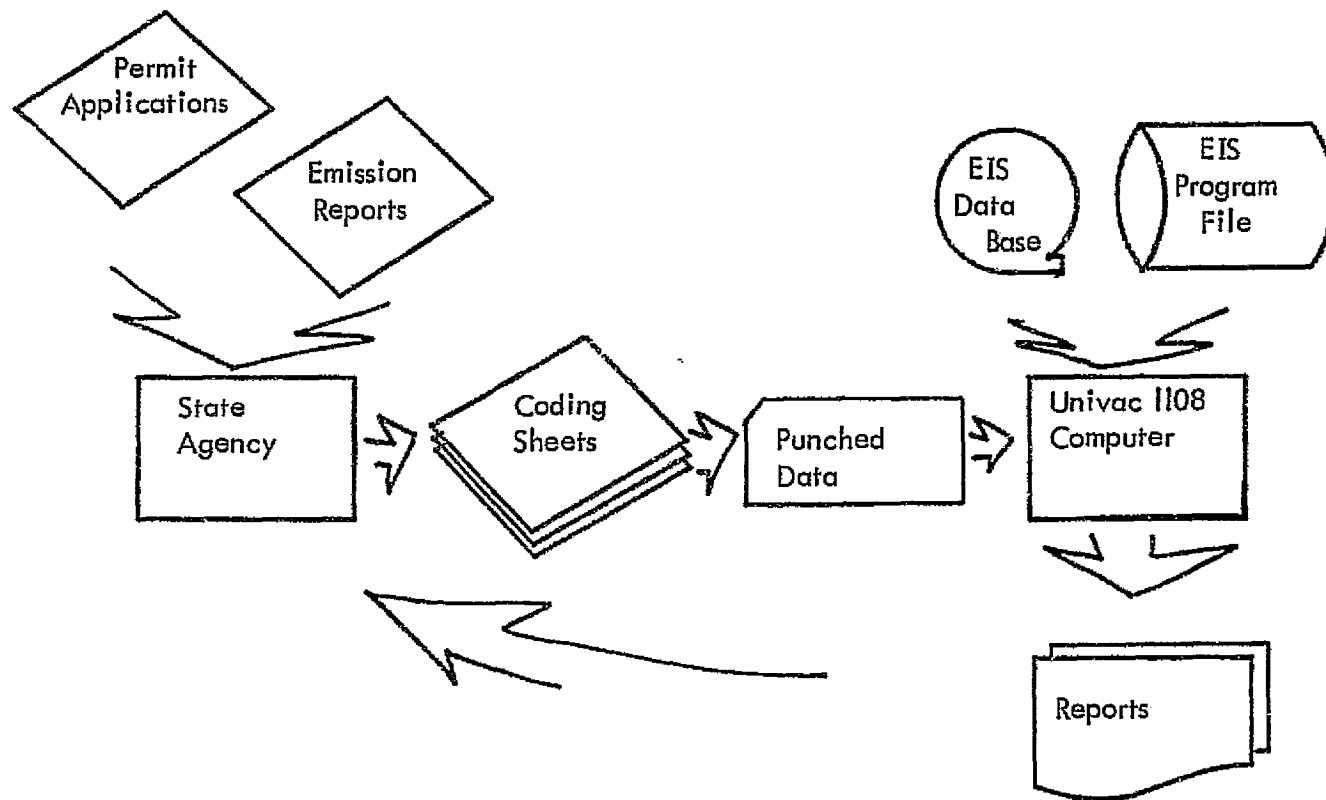


Figure 6. EIS System Overview

[illegible]

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[illegible]

### STACK PARAMETERS

DATE	DESCRIPTION	AMOUNT	CHECK NO.	BANK	INITIALS
10/1/78	DEPOSIT	100.00			
10/2/78	PAYROLL	50.00	101		
10/3/78	RENT	25.00	102		
10/4/78	SALES	75.00	103		
10/5/78	EXPENSES	15.00	104		
10/6/78	DEPOSIT	120.00			
10/7/78	PAYROLL	55.00	105		
10/8/78	RENT	25.00	106		
10/9/78	SALES	80.00	107		
10/10/78	EXPENSES	18.00	108		
10/11/78	DEPOSIT	110.00			
10/12/78	PAYROLL	52.00	109		
10/13/78	RENT	25.00	110		
10/14/78	SALES	78.00	111		
10/15/78	EXPENSES	16.00	112		
10/16/78	DEPOSIT	115.00			
10/17/78	PAYROLL	53.00	113		
10/18/78	RENT	25.00	114		
10/19/78	SALES	79.00	115		
10/20/78	EXPENSES	17.00	116		
10/21/78	DEPOSIT	118.00			
10/22/78	PAYROLL	54.00	117		
10/23/78	RENT	25.00	118		
10/24/78	SALES	81.00	119		
10/25/78	EXPENSES	19.00	120		
10/26/78	DEPOSIT	122.00			
10/27/78	PAYROLL	56.00	121		
10/28/78	RENT	25.00	122		
10/29/78	SALES	82.00	123		
10/30/78	EXPENSES	20.00	124		
10/31/78	DEPOSIT	125.00			
11/1/78	PAYROLL	57.00	125		
11/2/78	RENT	25.00	126		
11/3/78	SALES	83.00	127		
11/4/78	EXPENSES	21.00	128		
11/5/78	DEPOSIT	128.00			
11/6/78	PAYROLL	58.00	129		
11/7/78	RENT	25.00	130		
11/8/78	SALES	84.00	131		
11/9/78	EXPENSES	22.00	132		
11/10/78	DEPOSIT	131.00			
11/11/78	PAYROLL	59.00	133		
11/12/78	RENT	25.00	134		
11/13/78	SALES	85.00	135		
11/14/78	EXPENSES	23.00	136		
11/15/78	DEPOSIT	134.00			
11/16/78	PAYROLL	60.00	137		
11/17/78	RENT	25.00	138		
11/18/78	SALES	86.00	139		
11/19/78	EXPENSES	24.00	140		
11/20/78	DEPOSIT	137.00			
11/21/78	PAYROLL	61.00	141		
11/22/78	RENT	25.00	142		
11/23/78	SALES	87.00	143		
11/24/78	EXPENSES	25.00	144		
11/25/78	DEPOSIT	140.00			
11/26/78	PAYROLL	62.00	145		
11/27/78	RENT	25.00	146		
11/28/78	SALES	88.00	147		
11/29/78	EXPENSES	26.00	148		
11/30/78	DEPOSIT	143.00			
12/1/78	PAYROLL	63.00	149		
12/2/78	RENT	25.00	150		
12/3/78	SALES	89.00	151		
12/4/78	EXPENSES	27.00	152		
12/5/78	DEPOSIT	146.00			
12/6/78	PAYROLL	64.00	153		
12/7/78	RENT	25.00	154		
12/8/78	SALES	90.00	155		
12/9/7					

HEIGHT (FT.)	20
DIAMETER (FT.)	60
TEMPERATURE (DEG F)	
FLOW RATE (CFM)	
PLUME HEIGHT (FT.)	

COMPLIANCE STATUS 3  
FINAL COMPL. DATE 0574  
LATEST COMPL UPDATE  
ECAP STATUS SUBMITTED

EST CONTROL EFFCY 8

[illegible]

PART	
SO2	0
NOX	0
HC	0
CO	0

REGULATION	1
REGULATION	2
REGULATION	3

### \$ ANNUAL THRUPTUT

### NORMAL OPERATION

HOUR/DAY	8
DAY/WEEK	5
WEEK/YEAR	10

DEC-FEB	05
MAR-MAY	05
JUN-AUG	85
SEPT-NOV	05

ALLOWABLE EMISSION(T/YR)

[illegible]

PART	00000006
502	99999999
NOX	99999999
HC	99999999
CB	99999999

```

PART  EMIS  CALC  USING  EMIS  FACTRS
SO2   EMIS  CALC  USING  EMIS  FACTRS
NOX   EMIS  CALC  USING  EMIS  FACTRS
HC    EMIS  CALC  USING  EMIS  FACTRS
CO     EMIS  CALC  USING  EMIS  FACTRS

```

ANNUAL CHARGING  
RATE OF FUEL OR  
SOLID WASTE

MAX HOURLY  
DESIGN  
RATE

SULFUR  
CONTNT  
8

ASH  
CONT  
g

HEAT	CONTNT	HRTU/5
1	100	100
2	100	100
3	100	100
4	100	100
5	100	100
6	100	100
7	100	100
8	100	100
9	100	100
10	100	100
11	100	100
12	100	100
13	100	100
14	100	100
15	100	100
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83	100	100
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86	100	100
87	100	100
88	100	100
89	100	100
90	100	100
91	100	100
92	100	100
93	100	100
94	100	100
95	100	100
96	100	100
97	100	100
98	100	100
99	100	100
100	100	100

SOURCE  
CODE

CONFIDENTIAL  
OF DATA

## CONTENTS

30600 201  
3900 01  
39000 01

20030  
6  
2

50000

3.5

— — — — —

	0
	140
	1000

P  
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2  
2  
3

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## MIRADS

MIRADS<sup>11, 12, 13</sup> is a data management system. That is, it is a software package which provides the user with the capability of placing his data base on-line and of accessing this data base in the minimum amount of time and with the minimum amount of effort. This software package consists of a set of computer programs to assist the user in two areas: first, in placing his application in MIRADS, and second, in accessing his application after it has been placed in MIRADS.

### Placing an Application in MIRADS

Three steps are required in placing an application in MIRADS: 1) creating a MIRADS formatted data base, 2) defining a dictionary of the data base, and 3) linking the data base and dictionary in MIRADS. A generalized flow diagram depicting these steps is given in Figure 8.

The majority of applications wanting to use MIRADS already have data stored in some type of data base. Therefore, this data base must be reformatted to correspond to MIRADS's specifications. A set of COBOL and FORTRAN subroutines (labeled MRANDH routine) are available to assist in the reformatting. The EMS and EIS systems are both batch systems. Therefore, a COBOL program was written to reformat the EMS data base to a MIRADS format. The EMS system has a number of different record types including several comment records. To reduce the size of the MIRADS data base, the EMS comment records and a number of the data field were deleted. The batch EIS system was originally written using the MIRADS input/output routines; therefore, no reformatting program was required.

A dictionary must also be defined for each data base. This dictionary provides the interfacing necessary for the user to access data in his data base. The dictionary includes, for each field in the data base, its location, retrieval code name, and report heading name. A set of five coding forms are available to

# Building MIRADS Formatted Data Base

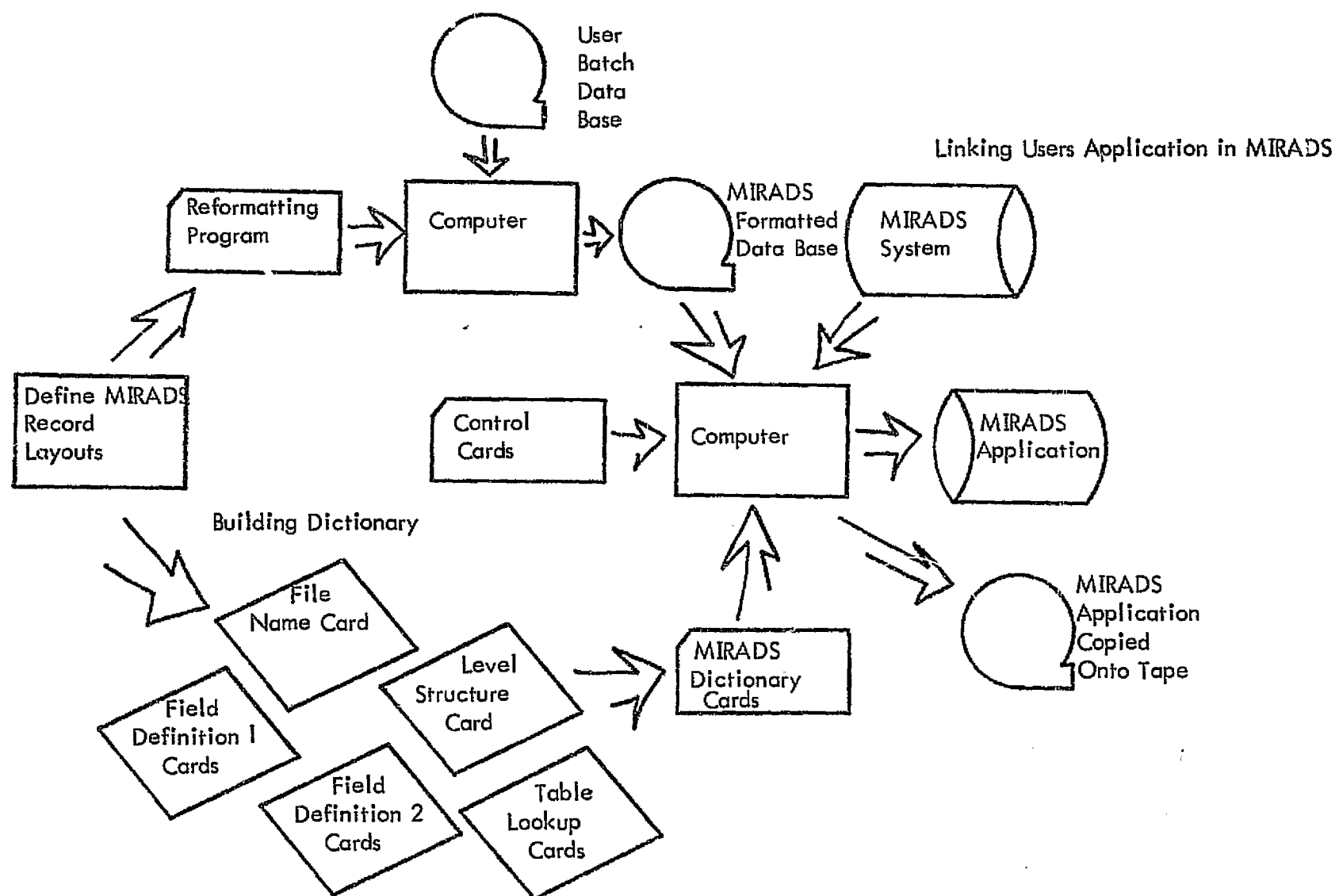


Figure 8. Steps in Building an Application in MIRADS

assist the user in defining his dictionary. These forms are described in Reference 13. The EMS dictionary is given in Appendix B. The EIS dictionary is given in Appendix C.

The final step in placing the user's application in MIRADS is to prepare the necessary control cards for linking the reformatted data base and the dictionary with MIRADS. These control cards call the various MIRADS routines which build the interfaces between the user input/output requests and his data base. Control tables are also built describing the data base, the location of data within it, and the association of data with user defined names.

#### Accessing an Application in MIRADS

An overview of the hardware and communications equipment required to support the MIRADS system is given in Figure 9. The system can support a variety of remote devices including typewriter terminals, cathode ray tubes, and reader/printer batch terminals. These various terminals are the user's means of interacting with the central facility and the MIRADS. At the central computer facility both the MIRADS system and user data bases are stored on auxiliary storage. Through the appropriate instructions the MIRADS system and selected data base are loaded into the computer ready to respond to the user's commands. For lengthy responses, the user's output can be routed to a high speed printer at the central facility and then forwarded to the user. The AAPCC in Montgomery has a Wang 2200 mini computer connected via regular telephone lines to the UAH Computer Center. The Wang mini computer system consists of a 16K central processor, a cathode ray tube terminal with keyboard, floppy disk storage, and a line printer.

#### Querying a Data Base

As with most languages, the user is required to state his inquiry in the commands of the language. A group of these commands combined to state an inquiry is called a query set. The major commands of a query set are QUERY, SORT, COMPUTE, PRINT, UPDATE, and SAVE. In addition to these major commands, there are three minor commands: RUN, which signifies the end of a query set

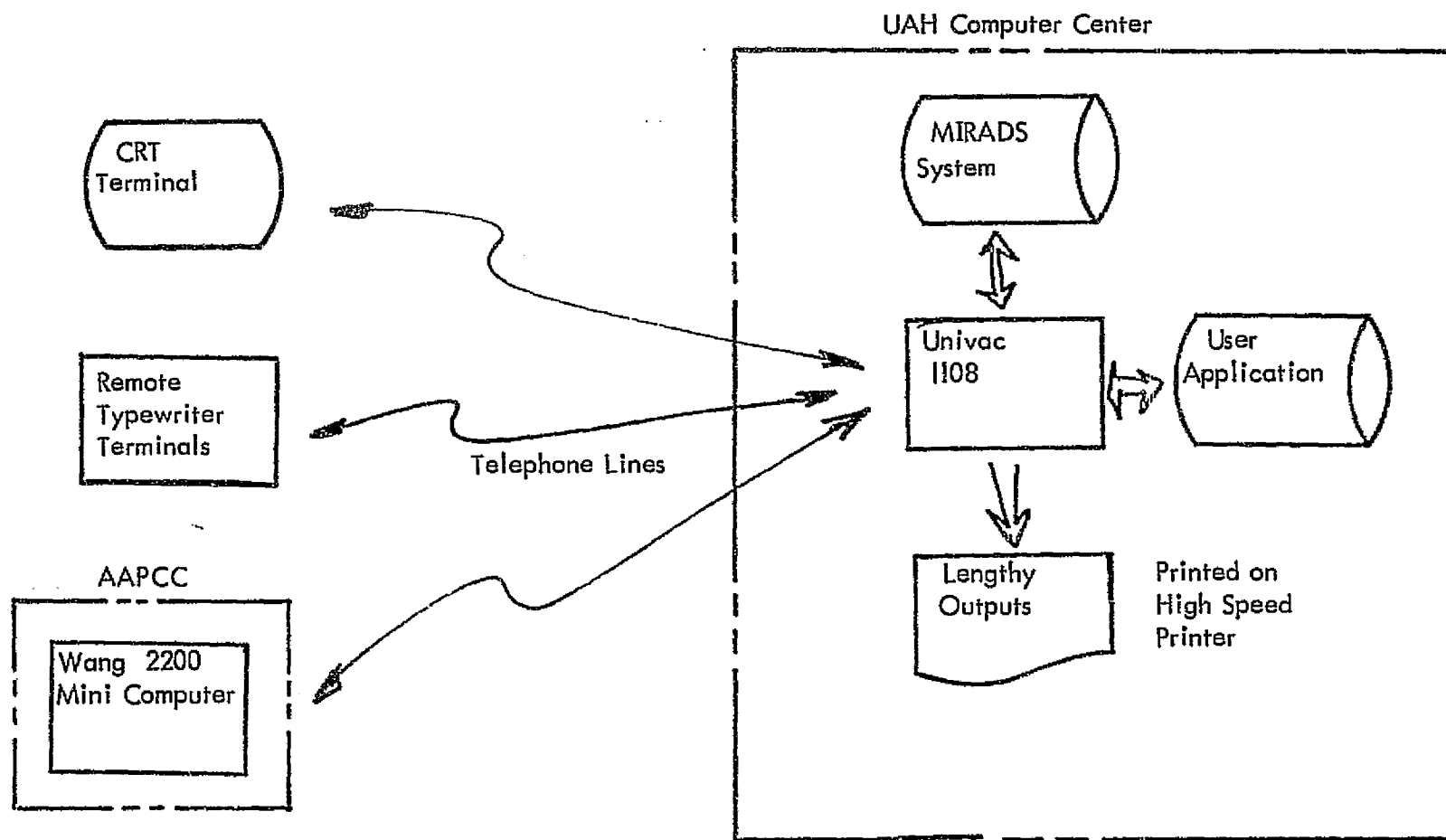


Figure 9. Accessing An Application in MIRADS

and that processing is to begin; TOP, which deletes an invalid query set or command; and NEW, which accesses a new data base. Each query set must begin with a QUERY command for selecting records from the data base, have a PRINT command for displaying the records, and end with a RUN command. A brief description of these commands is given in the following paragraphs.

The QUERY command is used for selecting records from the user's data base. The format of the QUERY command is given in Figure 10. As indicated by the figure, records can be selected which meet the relational test for one criteria or a combination of relational tests for multiple criteria using the logical operators. For data bases with narrative data, records can be selected using the relational for a keyword or keyphrase within a given record.

After the desired records have been selected by the QUERY command and placed in a hit file, the user has the option to SORT, COMPUTE, UPDATE, or PRINT these records. The formats of these commands are given in Figure 11. The SORT command is used for sequentially ordering the records in the hit file. Multi-fields can be used to sort the records in either ascending or descending order. Primary and secondary sort fields can be identified. Partial fields can be sorted by designating the number of characters within a field as the sort key. The COMPUTE command is used for performing calculations on the records in the hit file. These calculation capabilities include addition, subtraction, multiplication, division, exponentiation, counting, and summing. The PRINT command is used to display data in the hit file in a user specified format. A data suppression option is available which suppresses the printing of successive values until the value of the field changes. A table lookup feature decodes a value of a field and prints the stored literal instead. A columnar positioning capability allows printing to begin in any column on the print page. A line skipping capability is also available. The capability also exists for printing five lines of field-titles and five lines of data for each record in the hit file.

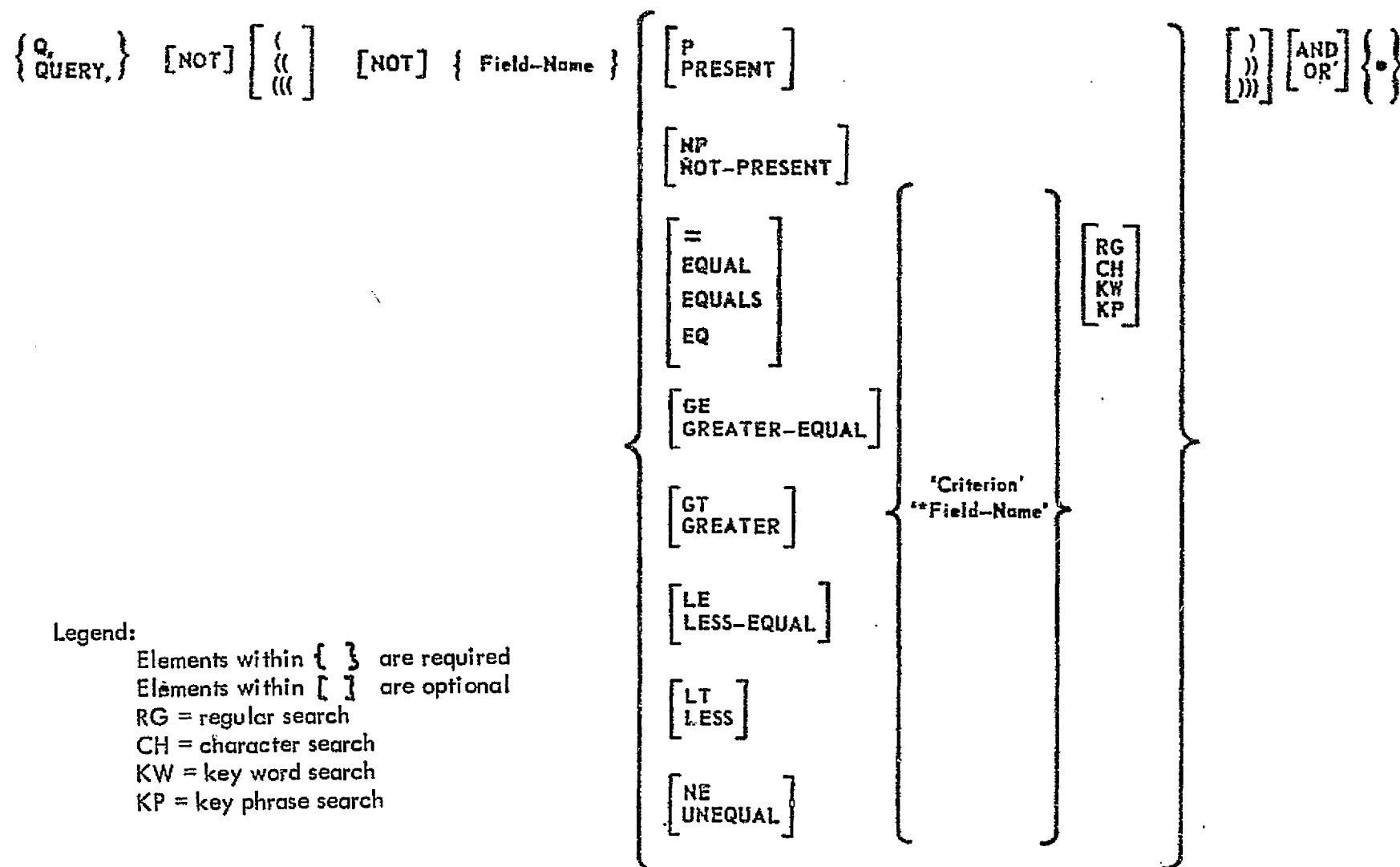


Figure 10. Query Command



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{S,  
SORT,} { Field-Name } [A  
D] [nn] {:

{C,  
COMPUTE,} { ALL,  
NONE,  
Break-Field-Name, } {n,} { \$New-Variable } {  
=  
EQ  
EQUAL  
EQUALS } { COUNT Field-Name  
SUM Field-Name  
Algebraic Expression } {.

{ UPDATE,  
U, } { C,  
D,  
I,  
R, } { FIELD-NAME  
RECORD-TYPE } { =  
EQ  
EQUAL  
EQUALS } { 'NEW-VALUE' } { . }

{ P,  
PRINT, } { nn,  
FULL,  
SM,  
SUM, } [SPACE n] [PPOS nnn] { Field-Name  
\$New-Variable } [LOOKUP  
TLU  
L] [GROUP n] [G n] [SPACE n] [S n] { ; }

Legend:

Elements within { } are required  
Elements within [ ] are optional

A = ascending  
D = descending  
C = change  
D = delete (update)  
I = insert  
R = replace

Figure II. Other MIRADS Commands

Modifications can be made to a data base using the UPDATE command. The available functions of the command are change, delete, insert, and replace. Before the change, delete or replace option is specified, a QUERY command must be entered to select those records which are to be updated. When the insert option is not preceded by a QUERY command, a new record will be inserted at the end of the user's data base.

The SAVE command permits a specific inquiry to be saved, under a given name, for recall at a later date. Related to the SAVE command are the LIST, DO, DELETE, and DISPLAY command for listing all saved inquiries and executing, deleting, and displaying a specific command, respectively.

#### MIRADS Considerations

The Univac 1108, which is located on the UAH campus, is a regional processing center for the Univac Division of Sperry Rand. Consequently, the MIRADS system is being operated in a commercial environment. Two of the costs, which are not so noticeable in supporting the MIRADS system, are: the cost of auxiliary storage of 0.5 CFU's/track/day, and the demand (on-line, real-time via a terminal) processing costs are three times the cost of batch processing. A description of the computer center billing algorithm is given in Appendix D. These costs have greatly influenced the use of the MIRADS system. First, the original MSFC MIRADS system required 192 tracks of drum storage (one track is equivalent to 1792 36 bit words). The routines comprising the MIRADS system can be grouped into (1) maintenance and (2) search and retrieval.

The maintenance routines are the necessary routines to create the user dictionary, to build the necessary files and linkage, and to unload these files onto permanent storage. These routines require 151 tracks of drum storage. The primary routines used during a maintenance cycle are MA.AMDGEN, MA.AMDRLG, MA.AMMCTG, and MA.AMUNLD. The first program in the generation cycle is MA.AMDGEN. This program generates the file DICTIONARY which is used to describe the contents of the Data Base, assign relative locations to the Data Base

records, and to relate names to the industrial fields within the records. Following the creation of the file DICTIONARY, the Data Relation List or DRL file is generated. The program name is MA.AMDRLG. This program also generates two other files which are used as input to the INDEX generation program which is named MA.AMIGEN. The INDEX file is generated to enable rapid responses to user inquiries. The MA.AMMCTG program then generates the Master Control Table. All these files are then placed on a permanent type of storage such as tape using the program MA.AMUNLD. The search and retrieval routines are the routines to access and query a user's application. These routines require 41 tracks of drum storage.

Since the cost of using the MIRADS was an important consideration, separate files were made of the maintenance and the search and retrieval routines. Then, when a data base was added to MIRADS, the maintenance file was loaded. To access a user's application, only the search and retrieval file was loaded.

Since economics were an important consideration, both the MIRADS routines and the EMS and EIS data bases were permanently stored on magnetic tape. By doing this, no auxiliary storage costs were accrued during those days that no accesses were made to either of the systems. If one of the systems was used during the day, the system was loaded onto auxiliary storage for the entire day. Then, before the end of the first shift, the files were deleted from auxiliary storage.

To assist the AAPCC in using the two systems, especially since the systems were permanently stored on tape rather than on-line, a number of small files were permanently assigned within the Univac operating system. In these files were placed all the required Univac control statement to load a system from tape to drum and then access the application, to access the application at a later time during the day without reloading, and to delete the system from drum storage. These files were named COLD, HOT, and DEAD. To distinguish between the EMS and EIS system, the EMS files were named COLDA, HOTA, and DEADA and the EIS files named COLDB, HOTB, and DEADB. Listings of these files are given in Figures 12 and 13. The only differences between the EMS and EIS files are the tape numbers of the respective data bases and the file names.

1. @ASG,T TPA,T,80513
2. @DELETE,C MA.
3. @DELETE,C EMS.
4. @DELETE,C INDEMS.
5. @DELETE,C DRLEMS.
6. @DELETE,C MCTEMS.
7. @DELETE,C SAVEMS.
8. @REWIND,C TPA.
9. @ASG,UP MA,F///100
10. @ASG,UP EMS,F///100
11. @ASG,UP INDEMS,F///100
12. @ASG,UP DRLEMS.,F///100
13. @ASG,UP MCTEMS.,F///100
14. @ASG,UP SAVEMS.,F///100
15. @COPY,G TPA.,MA.
16. @FREE TPA.
17. @ASG,T TP,T,84749
18. @REWIND TP.
19. @MOVE TP,1
20. @COPY,G TP.,EMS.
21. @COPY,G TP.,INDEMS.
22. @COPY,G TP.,DRLEMS.
23. @COPY,G TP.,MCTEMS.
24. @COPY,G TP.,SAVEMS.
25. @FREE TP.
26. @XQT MA.AMIRADS

Control cards to load system from tape to drum and then execute.

1. @ASG,A MA.
2. @ASG,A EMS.
3. @ASG,A INDEMS.
4. @ASG,A DRLEMS.
5. @ASG,A MCTEMS.
6. @ASG,A SAVEMS.
7. @XQT MA.AMIRADS

Control cards to execute system which previously has been loaded.

1. @FREE MA.
2. @FREE EMS.
3. @FREE INDEMS.
4. @FREE DRLEMS.
5. @FREE MCTEMS.
6. @FREE SAVEMS.
7. @DELETE,C MA.
8. @DELETE,C EMS.
9. @DELETE,C MCTEMS.
10. @DELETE,C INDEMS.
11. @DELETE,C DRLEMS.
12. @DELETE,C SAVEMS.

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Control cards to delete system from drum.

Figure 12. EMS ADD Elements.

1. @ASG,T TPA,T,80513
2. @DELETE,C MA.
3. @DELETE,C EIS.
4. @DELETE,C INDEIS.
5. @DELETE,C DRLEIS.
6. @DELETE,C MCTEIS.
7. @DELETE,C SAVEIS.
8. @REWIND TPA
9. @ASG,UP MA.,F///100
10. @ASG,UP EIS.,F///100
11. @ASG,UP INDEIS.,F///100
12. @ASG,UP DRLEIS.,F///100
13. @ASG,UP MCTEIS.,F///100
14. @ASG,UP SAVEIS.,F///100
15. @COPY,G TPA.,MA.
16. @FREE TPA.
17. @ASG,T TP,T,82398
18. @REWIND TP
19. @COPY,G TP.,EIS.
20. @COPY,G TP.,INDEIS.
21. @COPY,G TP.,DRLEIS.
22. @COPY,G TP.,MCTEIS.
23. @COPY,G TP.,SAVEIS.
24. @FREE TP.
25. @XQT MA.AMIRADS

Control cards to load system from tape to drum and then execute.

1. @ASG,A MA.
2. @ASG,A EIS.
3. @ASG,A INDEIS.
4. @ASG,A DRLEIS.
5. @ASG,A MCTEIS.
6. @ASG,A SAVEIS.
7. @XQT MA.AMIRADS

Control cards to execute system which previously has been loaded.

1. @FREE MA.
2. @FREE EIS.
3. @FREE INDEIS.
4. @FREE DRLEIS.
5. @FREE MCTEIS.
6. @FREE SAVEIS.
7. @DELETE,C MA.
8. @DELETE,C EIS.
9. @DELETE,C INDEIS.
10. @DELETE,C DRLEIS.
11. @DELETE,C MCTEIS.
12. @DELETE,C SAVEIS.

Control cards to delete system from drum.

Figure 13- EIS ADD Elements

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### Accessing the System

The procedure for accessing a user's data base, once it has been placed in MIRADS, is quite simple. Only three messages are necessary. First, after dialing the appropriate telephone number for establishing the necessary communications between the user's terminal and the central computer facility, the user enters the terminal site identification. The system will respond acknowledging connection with the central computer facility. Second, the user enters his run identification which contains his account number. The system will respond with the date and time of day. Third, the user enters the appropriate ADD statement, either COLD, HOT, or DEAD. A typical set of instructions for accessing the EIS system using COLDB is given in Figure 14. The MIRADS system is then transferred from auxiliary to core storage. Upon completion, the MIRADS sign on procedure is begun. This sign on procedure is a security check on each user. The user must enter two passwords before he can access a specific data base. The first password is the security key. The second password is the file name or data base.

To exit MIRADS the user enters STOP. MIRADS will respond with a termination message giving the time of day and the expended cpu time. To exit the central computer facility, the user enters @FIN. The central facility will then respond with the accounting information for the run. The user then enters @@TERM to disconnect the telephone line.

```

DLIUAH
BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBI

*UNIVAC 1100 OPERATING SYSTEM VER. 31.159B*H052(RSI)*
BRUN,/Z MIRADS,UAHSR747901F,1000-MIRADS
  BBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
DATE: 042975      TIME: 131525
ADD COLDB.
READY
FURPUR 0026-04/29-13:15

EIS      IS NOT CATALOGUED OR ASSIGNED
FAC STATUS: 400010000000
INDEIS      IS NOT CATALOGUED OR ASSIGNED
FAC STATUS: 400010000000
DRLEIS      IS NOT CATALOGUED OR ASSIGNED
FAC STATUS: 400010000000
MCTEIS      IS NOT CATALOGUED OR ASSIGNED
FAC STATUS: 400010000000
SAVEIS      IS NOT CATALOGUED OR ASSIGNED
FAC STATUS: 400010000000
READY
READY
READY
READY
READY
READY
FURPUR 0026-04/29-13:16
  41 BLOCKS COPIED
EOF ENCOUNTERED ON INPUT TAPE
READY
READY
FURPUR 0026-04/29-13:16
  194 BLOCKS COPIED
EOF ENCOUNTERED ON INPUT TAPE
  33 BLOCKS COPIED
EOF ENCOUNTERED ON INPUT TAPE
  9 BLOCKS COPIED
EOF ENCOUNTERED ON INPUT TAPE
  15 BLOCKS COPIED
EOF ENCOUNTERED ON INPUT TAPE
  1 BLOCK COPIED
EOF ENCOUNTERED ON INPUT TAPE
READY
ENTER SECURITY KEY
EMISSIONS
ENTER QUALIFIER*FILENAME
EIS
READY

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Figure 14. Procedure for Accessing the EIS System Using COLDB

## TYPICAL INQUIRIES

A variety of different types of inquiries were formulated during the evaluation. The majority of these inquiries used only the QUERY and PRINT commands. Of the sample of 97 inquiries, 13 (14 percent) used the SORT command and 10 (10 percent) used the COMPUTE command. The SORT command was used with nine of the ten COMPUTE commands, which reflects the use of the system for compiling frequency distributions. The UPDATE option was not used since both the EMS and EIS systems have elaborate edit and update capabilities. The pre-formatting capability was not available on the MIRADS release and, therefore, not evaluated.

Several of the inquiries asked of the EMS and EIS systems are given in Appendix E. The batch EMS system generates 3,000 pages of reports. The size of the data base has grown so large that it is quite time consuming to page through the reports to locate the desired information. The MIRADS EMS system has been used to further summarize these batch reports. A set of queries were defined and are periodically run against the data base. These inquiries were a list of all facilities and their addresses by region - county, a list of all facilities by industrial classification (SIC codes), and a list of the status of various actions. In addition, a number of frequency distributions were also compiled such as distributions of all performed actions and distributions of actions by staff member.

To single out one of these inquiries, the frequency distribution of all performed actions is a required quarterly reporting item. This item was requiring from three to five man days to compile by manually paging through the reports. The MIRADS system used thirteen seconds of cpu time or less than \$25. Another example is the listing of all facilities and their address. Using MIRADS, this information was summarized on less than twenty pages.

The uses of the MIRADS EIS system were similar to the EMS system. A set of inquiries were also defined to further summarize the EIS data base. These inquiries included a listing of all area and point sources and their addresses and a listing which tabulated emissions by air quality control region, county, and facility.



An attempt was made to also tabulate emissions by UTM grid coordinates, such as by ten square kilometers. To do this would have required an extensive modification of the dictionary. In addition, the MIRADS EIS system was also used to select and then reformat data for input into a dispersion model - the Air Quality Display Model. This inquiry selected the appropriate sources in the area being modeled and then converted the stack data to metric units for use in the model.

## ANALYSIS

The costs in using MIRADS can be divided into the cost of building and linking the user's application into MIRADS and the cost of then accessing and querying the user's application.

### Building and Linkage Cost

The costs of building the user's application consist of both a fixed and variable cost. The fixed costs are associated with the man-hours in writing the reformatting program and in defining the MIRADS dictionary. For the EMS system, approximately 80 man-hours of programming were expended in writing the reformatting programming and 24 man-hours in defining the dictionary. Both these tasks used less than 30 minutes of computer time and were written and debugged in fifteen work days. The EIS system did not require the reformatting program. Consequently, only 24 man-hours were required to define the dictionary. This task used less than 10 minutes of computer time and was completed in five work days.

The maintenance cycle is required for each data base update. The cost of executing this cycle is a function of the size of the data base and also the number of indexed fields in the dictionary. Figure 15 depicts these costs in terms of cpu time versus the number of indexed fields. An interesting observation is that the cpu time to build a system containing 3,370 records and four indexed fields is approximately the same as a system of 1,240 records and 11 indexed fields or a system of 140 records with 22 indexed fields. Therefore, the number of indexed fields has a significant impact of the cpu time to build a system.

Figure 16 depicts the cpu time versus the number of records in the data base. Although a maximum of only four data points were plotted per curve in Figure 16, it appears that the cpu time versus the number of records is linear. That is, for a fixed number of indexed fields, the cpu time to build the system increases

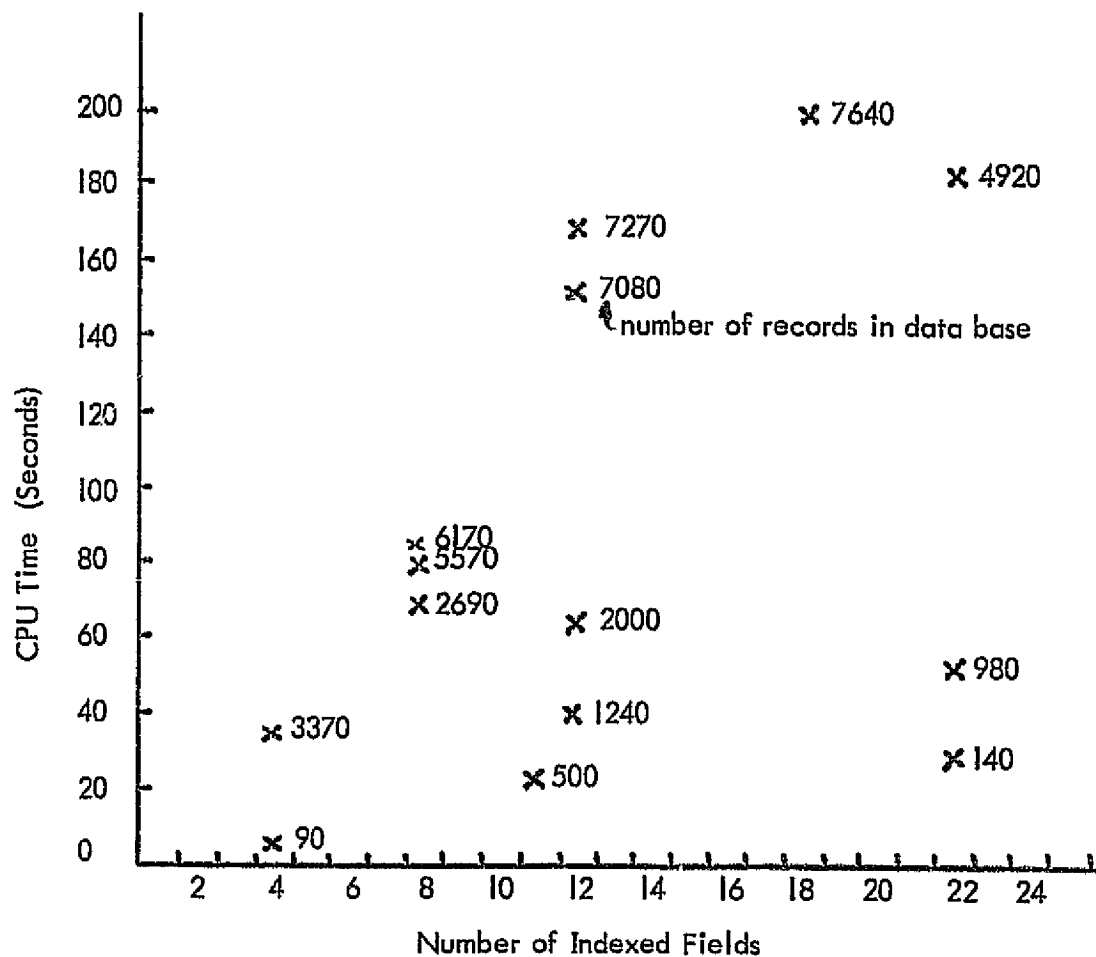


Figure 15. CPU Time to Build System Versus Number of Indexed Fields

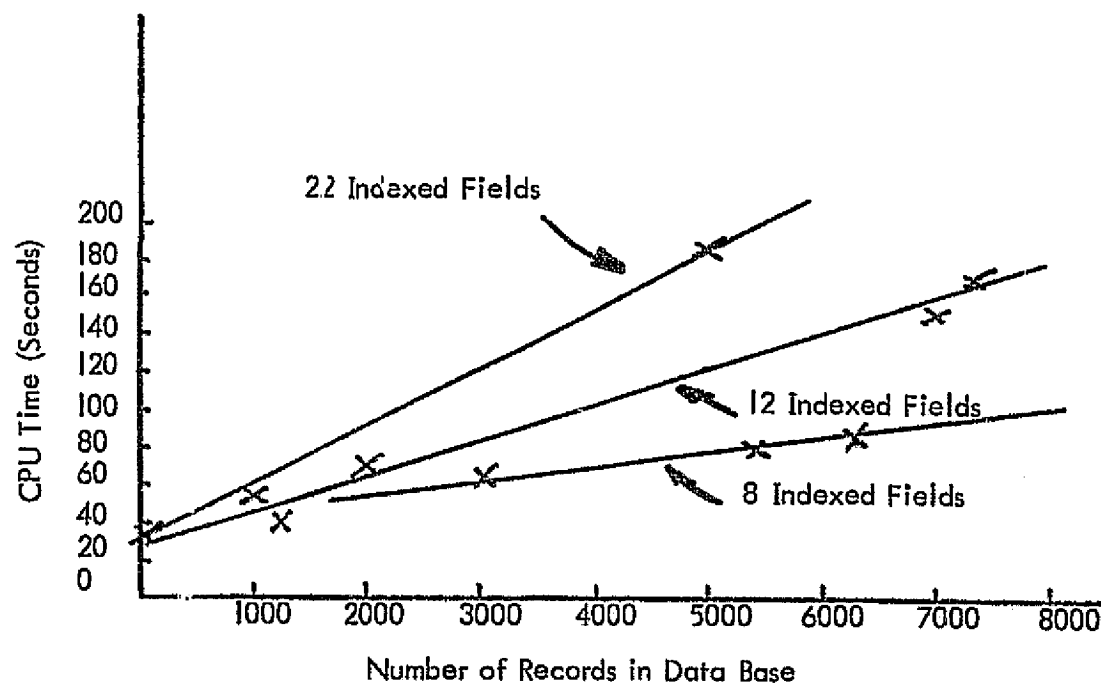


Figure 16. Time to Build System Versus Size of Data Base

linearly with the size of the data base. This rate of increase is greater with the number of indexed fields. Also, the slope increases as a function of the number of indexed fields. From these three curves, the doubling the number of indexed fields will increase the cpu's by fifty percent.

#### Accessing and Querying Cost

The actual costs of accessing and querying an application are a function of several parameters. The accessing costs depend on whether the application is on tape and needs to be transferred to on-line storage, or if the application is already residing on-line. The difference in cpu time in these accessing methods is relatively small. The cpu time to load a system from tape is 1-3 seconds more than if the system is already on-line. To minimize these costs, the EMS and EIS systems are both stored off-line on tape and then loaded at the beginning of the first shift. As previously discussed, a set of ADD elements (Reference Figures 12 and 13) have been defined to assist the AAPCC personnel in loading the systems. The systems are not loaded if the AAPCC are not anticipating using either of the systems for a given day. The ADD elements require six tracks of on-line storage. The daily cost is 6 tracks x 0.5 CFU's/track/day or 3 CFU's/day. The time to load and access both systems from tape to on-line storage is 7 cpu's (or 105 CFU's in a demand mode). Adding these two costs gives 108 CFU's/day. This compares favorably with the cost of permanently having both systems on-line, which is 252 CFU's/day. A detailed breakdown of these costs is given in Table I.

The distribution of the number of inquiries which were entered during a sitting is given in Figure 17. Based on the sample of 30 sittings (which were taken after system implementation), an average of three inquiries were entered per sitting. Only one inquiry was entered for thirty percent of the sittings. Six or more inquiries were entered for two of the sittings.

The corresponding distribution of the wall time (i.e. clock time) per sitting is given in Figure 18. Three of the sample thirty were submitted for batch processing

TABLE I  
Various System Costs

Parameter	System	
	EMS	EIS
<b>File Sizes</b>		
Add elements (COLD, HOT, DEAD)	3 tracks	3 tracks
Data Base	160 tracks	194 tracks
Index	28 tracks	33 tracks
Data relation list (DRL)	15 tracks	9 tracks
Master control table (MCT)	7 tracks	15 tracks
	<hr/>	<hr/>
Total Tracks	214 tracks	255 tracks
Total Daily Storage Charge	107 CFU's	128 CFU's
 MIRADS Search and Retrieval Routines	 41 tracks	 41 tracks
<b>Data Base Size</b>		
Number of records	7269	4915
Number of indexed fields	12	22
Number of sorted records	68076	60870
 <b>CPU Times (Batch, Off-Line)</b>		
Execute MA.AMDRLG	130 seconds	129 seconds
MA.AMIGEN	21 seconds	23 seconds
MA.AMMCTG	10 seconds	6 seconds
	<hr/>	<hr/>
Total CPU Time	170 seconds	182 seconds
Total CFU's Charge	600 CFU's	700 CFU's
 <b>Accessing Application</b>		
Execute COLD	4 seconds	3 seconds
Execute HOT	2 seconds	2 seconds
Execute DEAD	1 second	1 second

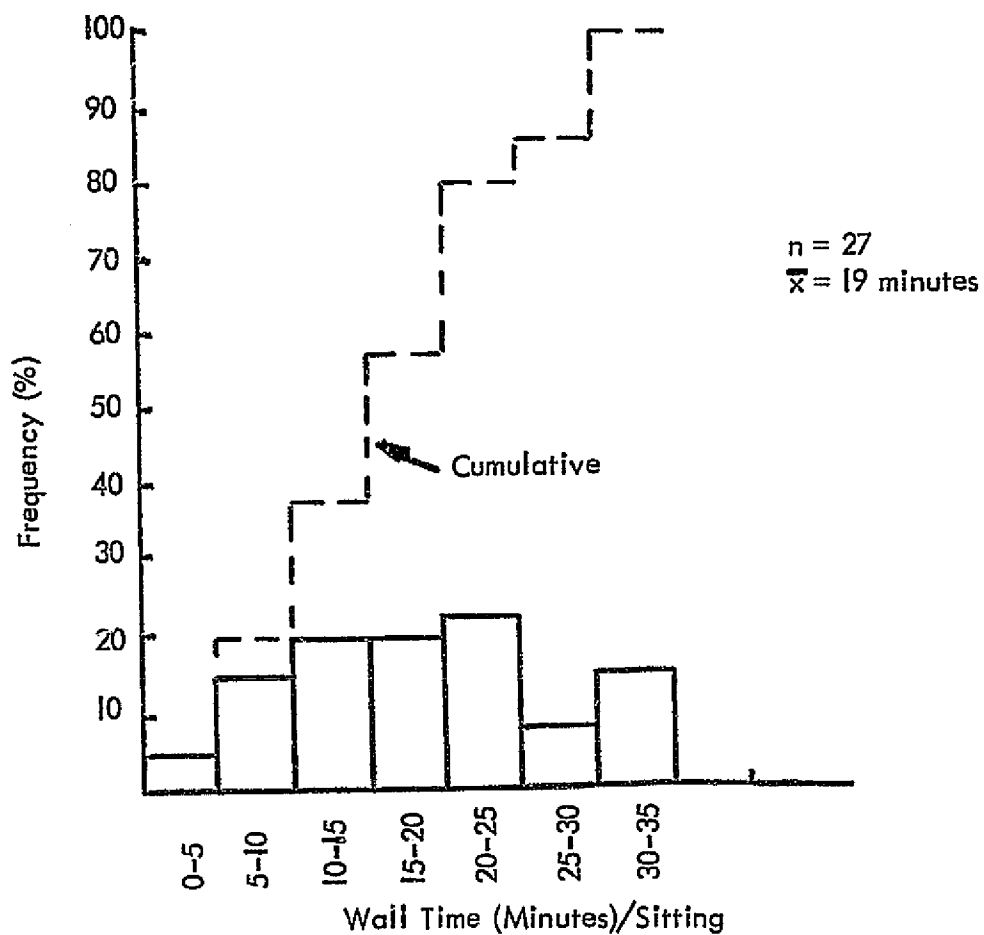


Figure 17. Distribution of Wall Time Per Sitting

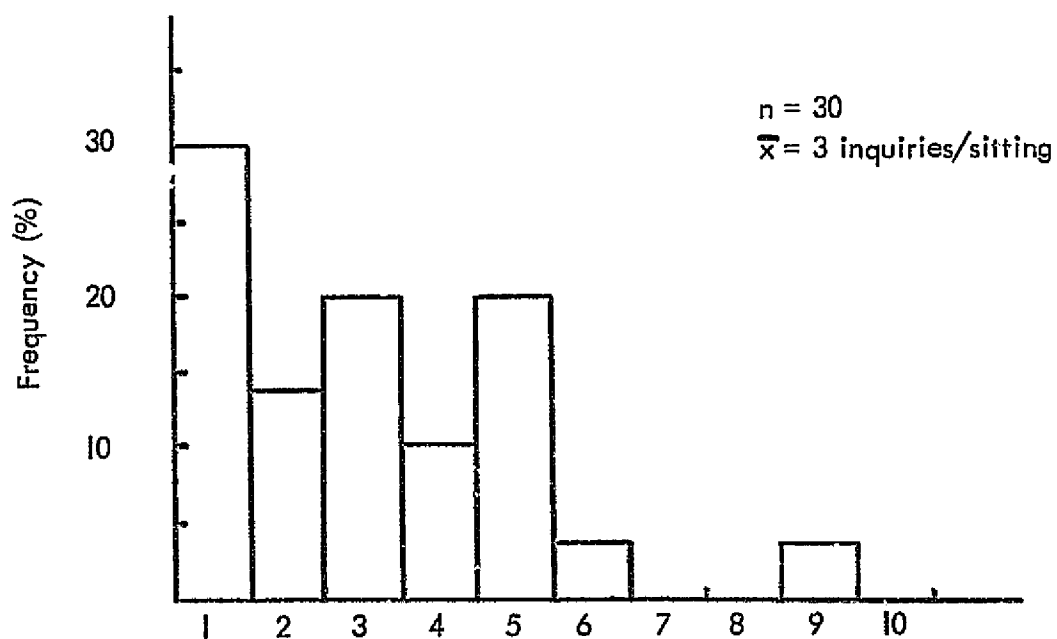


Figure 18. Distribution of the Number of Inquiries Per Sitting

and, therefore, are not included in Figure 18. Based on the sample of 27 sittings, an average of 19 minutes of wall time was expended per sitting.

The distribution of the total cpu time per sitting for the EMS and EIS systems are given in Figures 21 and 22 respectively. Over 45 percent of the EMS and 60 percent of the EIS inquiries required less than two seconds of cpu time. There was also a small percentage of the inquiries requiring more than 30 seconds of cpu time.

It should be noted that the way in which an inquiry is structured will significantly affect its run time. This run time is the maximum whenever a sequential search is necessary. In these instances, a complete search of the data base is required to satisfy the inquiry. The use of the indexed fields in defining an inquiry will eliminate a sequential search of the entire data base. For those indexed fields, the MIRADS system has built, during system generation, a table of pointers to the appropriated records. In other words, to the user it appears that the data base has been sorted on that particular indexed field, thereby eliminating the sequential search. Of all the inquiries which run during this evaluation, only two required a sequential search. In both instances, the search time was reduced by limiting the hit file to a fixed number of records. These data from these two inquiries are not included in any of the previous figures. The significance of only having two of these inquiries is that the proper identification of the indexed parameters can be a tremendous cost savings in inquiry run time.

Figures 19-22 only reflect cpu times and do not reflect the actual dollar charge. Therefore, using the sample of 30 sittings at the terminal a factor of 15.2 was calculated. This factor is only valid for operating in an on-line and real-time mode, which says that one second of cpu time is equivalent to a 15.2 CFU charge. Also, this factor is only valid for the computer center's present billing algorithm (Reference Appendix D). Presently, for a commercial customer, 5,000 CFU's are equivalent to \$425. Should the MIRADS system be run off-line in a batch mode, this factor is reduced to a factor of 6.2. There are also additional CFU reductions by running on the second and third shifts.

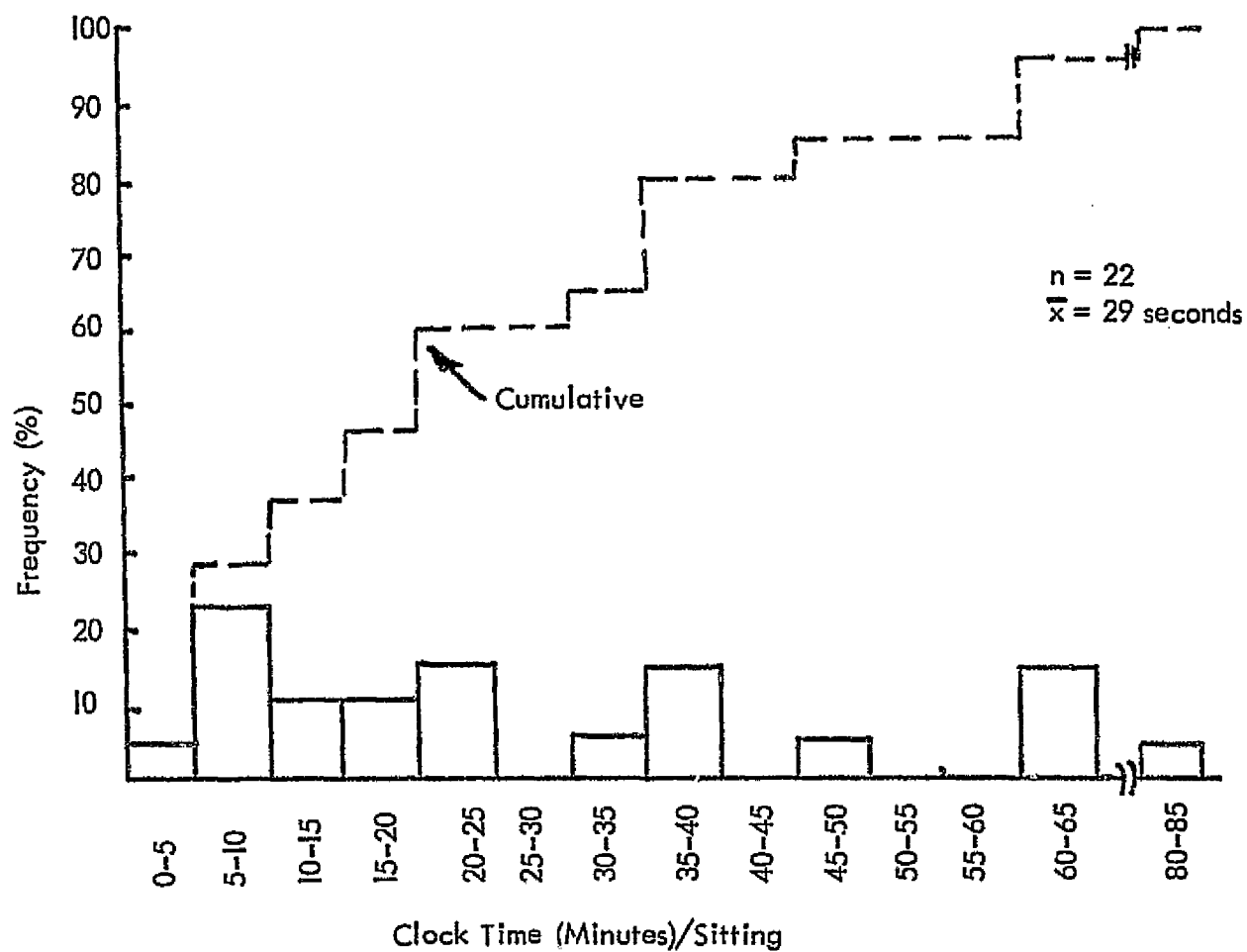


Figure 19. Distribution of Total CPU Time Per Sitting for EMS



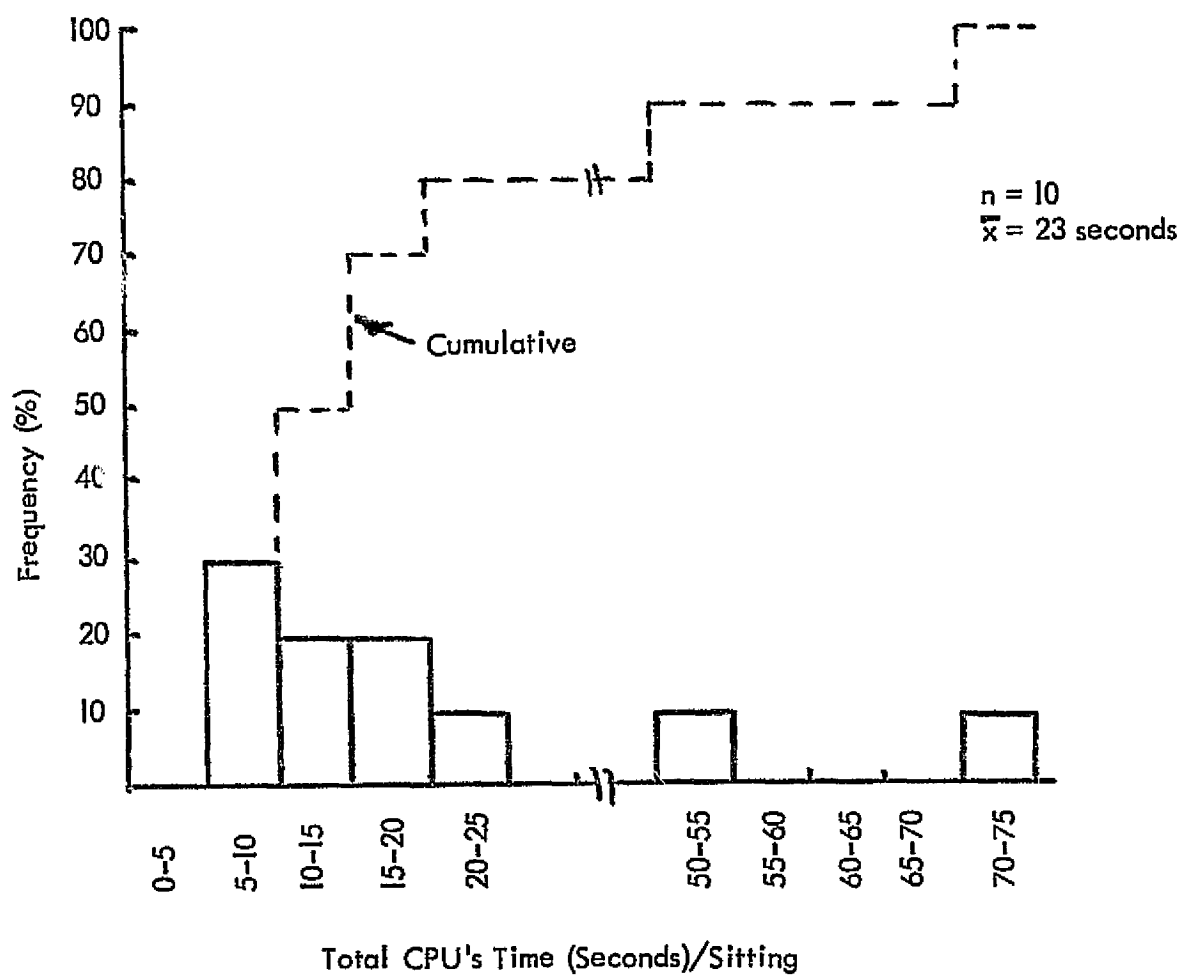


Figure 20. Distribution of Total CPU Time Per Sitting for EIS

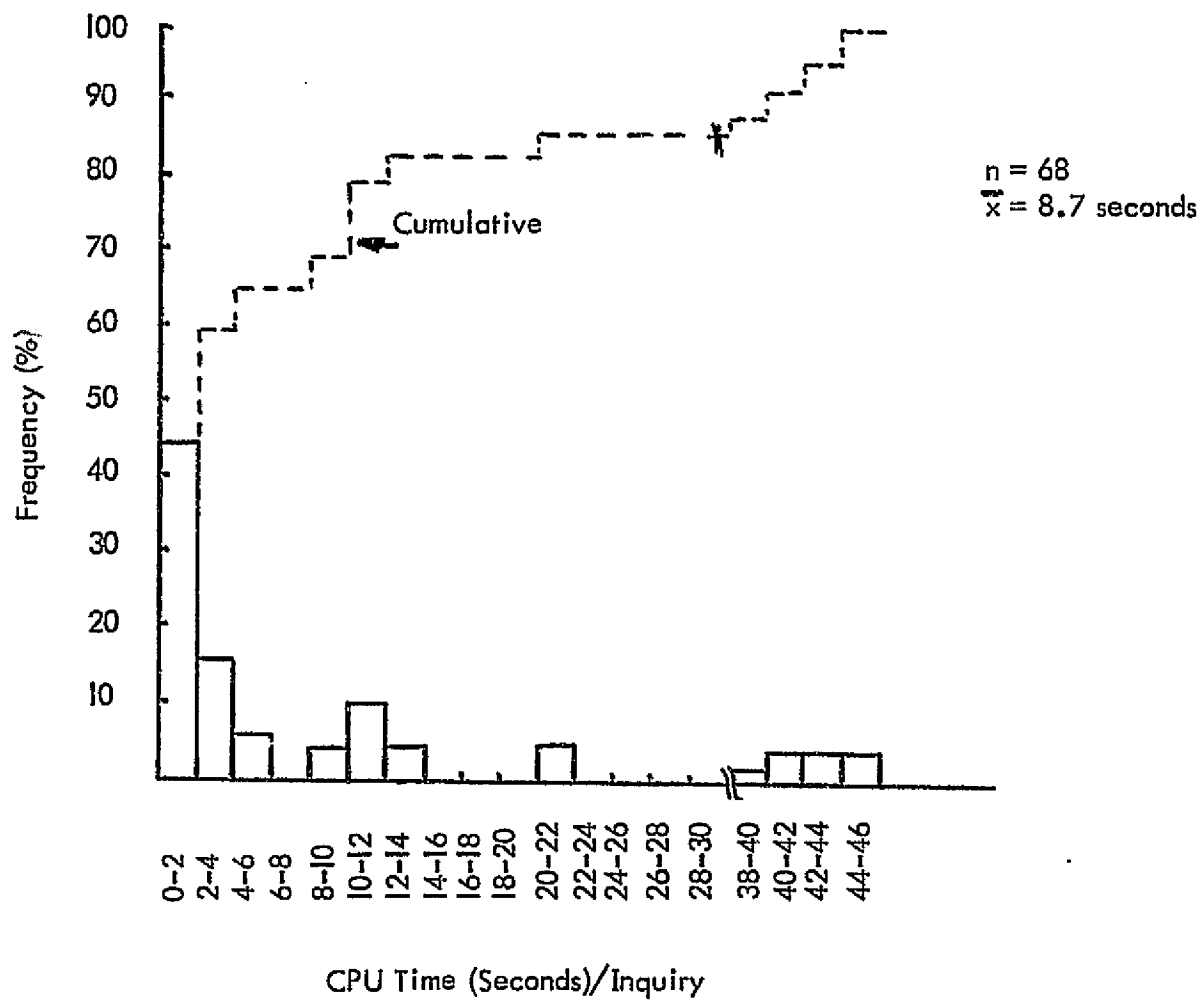


Figure 21. Distribution of CPU Time Per EMS Inquiry

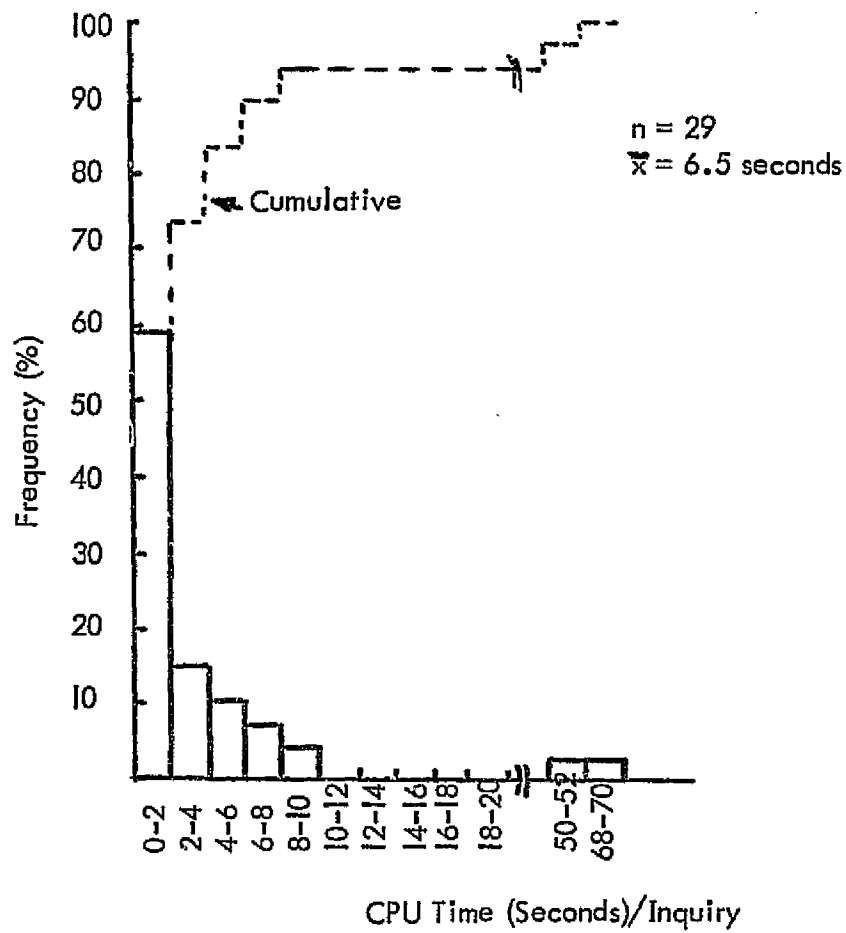


Figure 22. Distribution of CPU Time Per EIS Inquiry

Applying this factor of 15.2 to the average cpu times per sitting for the EMS and EIS system results in an average CFU charge of 440 CFU's (or \$37) for the EMS and 350 CFU's (or \$30) for the EIS system. The average cost per inquiry is 99 CFU's (or \$8) for the EMS and 132 CFU's (or \$11) for the EIS system. These costs are only average costs. Note that several of the EMS and EIS inquiries exceed 50 cpu seconds, or 760 CFU's (\$65). These same inquiries, which exceeded 50 cpu seconds, could be run in a batch mode for 310 CFU's (\$26) and at a greater savings on second and third shift.

The following areas have been identified for possible refinements to the MIRADS system:

- o Reduction in the amount of storage required for the search and retrieval file (e.g., having the user select the desired query commands).
- o Improve the efficiency of the search algorithm.
- o A user control option to have a hit file save or transferred to tape. (This tape would then be used as input to another program.)

After using the MIRADS system on EMS and EIS data, the following points can be made concerning the use of the MIRADS system:

- o The MIRADS system should be divided into a maintenance file and a search and retrieval file.
- o The MIRADS system and the user application should be stored on tape rather than on-line storage for those low frequency applications.
- o Lengthy inquiries should be checked out via demand mode and then run via a batch mode on the second or third shift.
- o The number of indexed fields has a significant impact on the cpu time to build a system.
- o A query set should be structured to include an indexed field.

## CONCLUSIONS

In summary, MIRADS demonstrates that a general purpose data management system can be effectively utilized by a variety of organizations, each having its own data handling and information requirements. With a minimum amount of effort and in a short time period, these organizations can have their data bases placed on-line and, even more important, can use their systems in a day to day environment. The problem is in measuring the effectiveness of MIRADS. This effectiveness must be measured in economical as well as technical terms.

Technically, it has been demonstrated that the MIRADS system does work and that it can be applied to a variety of applications, air pollution data being only one of the applications. Some of the technical advantages of MIRADS, which have been identified, are system flexibility, quick user application implementation, and ease of use. The flexibility of MIRADS is evident by the different applications using the system. The quick user application implementation is evident in that both the EMS and EIS systems were completely operational in less than one month. The ease of use is evident by its simple but powerful inquiry commands.

However, there are several technical limitations to MIRADS which are common to most general purpose systems. First, MIRADS is machine dependent. That is, the system is only operational on large Univac computer systems. Second, some degree of knowledge of the internal operations of MIRADS is desirable. This knowledge is most desirable when a user calls the computer center and says "The system does not work." This knowledge is most difficult to acquire. A systems man within the computer center must be assigned the task of learning MIRADS. This is an additional expense and could become a sizeable expense. For the AAPCC, this was no problem because of its existing data processing contract with the Center for Environmental and Energy Studies, and the CEES's close working relationships with NASA/MSFC.

To measure the effectiveness of MIRADS in terms of economics is rather difficult. In fact, to evaluate any system in only economic terms is difficult. However, if an economical evaluation of MIRADS could be made, it could be summarized in several words - MIRADS is expensive. How expensive is expensive requires further explanation.

As with most general purpose data management systems, the computer charges for operating these systems are greater than for tailor-made systems. However, when looking at the overall picture, these costs are quite small as compared to developing a tailored system. By using a general purpose data management system, many preliminary costs, prior to operation, are eliminated. First, there are no developmental costs, which can be staggering. Closely related with development is the time lag before the system is operational. It is not uncommon to spend months and even years in program development and checkout. The tradeoff must then be made if this time delay can be tolerated. Also, highly trained programming talent is required to have an efficient system. This talent is not only expensive, but also may be difficult to locate.

The Alabama Air Pollution Control Commission's EMS and EIS computer systems were placed in the MIRADS system in less than thirty days and required approximately four man weeks of effort and thirty minutes of computer time. After the systems had been placed in MIRADS, an additional man-month was required for training AAPCC personnel and for making additional refinements after the AAPCC had used the systems. These refinements primarily involved changes to the dictionary - the indexed fields and the type of data fields. In summary, both the EMS and EIS systems were checked out and operational by AAPCC personnel in less than two months.

The MIRADS system is very cost effective in terms of the costs associated with placing an application in MIRADS. However, the costs in accessing an application in MIRADS are high. The EMS and EIS systems have data bases of 7,269 and 4,915 records, respectively. The average cost per inquiry was 99 CFU's or \$8 for an EMS inquiry and 132 CFU's or \$11 for an EIS inquiry. Several of the inquiries exceeded 760 CFU's or \$65.

Although these inquiry costs are high, several tradeoffs must be considered. First, these inquiry costs could be reduced by running in a batch mode and on the second or third shifts. For most of the lengthy inquiries, the inquiries were first checked out via the terminal on first shift. The print command was used to limit the hit file to only a small number of records. The inquiries were then punched onto cards and submitted via the batch mode.

Secondly, although the inquiry costs are high, the question must be asked as to the costs for obtaining the same information either manually or by writing a computer program. In most instances, the inquiry costs are considerably less. The AAPCC has defined a set of inquiries which are periodically run against the two data bases. These inquiries can be considered as a set of computer programs. The costs to write these programs are almost nothing as compared with writing COBOL programs.

Most data management systems, such as MIRADS, have been designed for on-line real-time use in a day to day environment. In this instance, the data bases are resident on drum or disk storage. However, the MIRADS EMS and EIS are being used in a different environment. The day to day use of both systems is minimal. On the average, less than five inquiries are asked per week. Therefore, to be cost effective, both systems are stored on magnetic tape and only loaded onto drum or disk when used. This reflects the major use of the systems which is the generation of a standard set of periodic reports.

In summary, the MIRADS system has been demonstrated to be a feasible system for retrieving air pollution data from the Alabama Air Pollution Control Commission's Enforcement Management System and Emission Inventory System. These systems have been incorporated into the operations of the AAPCC and are providing a valuable management tool to the AAPCC in enforcing the state's air pollution rules and regulations.

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APPENDICES

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APPENDIX A  
EMS and EIS Batch System Record Layouts

TABLE I  
EMS DATA ELEMENT

Data Element	Number of Characters	Data Element	Number of Characters
SOURCE IDENTIFICATION RECORD			
Agency Code	3	Action Number	2
Region Code	2	Record Type (34)	2
County Code	2	Facility Description	25
Facility Number	4	Control Device	20
Permit Number	4	Filler	12
Filler (zeros)	2	Filler	12
Record Type (20)	2	Pollutants	16
UTM Zone	2	Filler	115
EW Grid Coord	6	Flag	1
NS Grid Coord	6	PERMIT ACTION RECORD	
Source Name	25	Agency Code	3
Source Mailing Address	20	Region Code	2
Source City	15	County Code	2
Source State	2	Facility Number	4
Source Zip	5	Permit Number	4
Contact's Telephone	10	Action Number	2
Contact's Name	15	Record Type (36)	2
SIC Code	5	Action Code	2
Inspector Code	3	Date Action Scheduled	6
Engineer Code	3	Date Action Performed	6
Source Description	25	Staff Member	3
Date Updated	6	Hours Action Taken	2
Facility Location Address	20	Filler	1
Facility Location City	15	Action Name	15
Time Factor	2	Action Results Code	2
Filler	16	Estimated Hours	2
SOURCE COMMENTS RECORD		Next Action Code	2
Agency Code	3	Send Letter Code	2
Region Code	2	Staff Member's Name	15
County Code	2	Staff Member's Title	15
Facility Number	4	Previous Action Code	2
Permit Number	4	Previous Action Date	6
Action Number	2	Next Action Date	6
Record Types (35 or 37)	2	Filler	114
Permit Comments	35	PERMIT COMMENTS RECORD AND PERMIT ACTION COMMENT RECORD	
Comment Line Number	1	Agency Code	3
Filler	165	Region Code	2
PERMIT RECORD		County Code	2
Agency Code	3	Facility Number	4
Region Code	2	Permit Number	4
County Code	2	Filler (zeros)	2
Facility Number	4	Record Type (21)	2
Permit Number	4	Source Comments	55
		Comment Line Number	1
		Inspector Name	15
		Engineer Name	15
		Filler	115

TABLE II  
AREA SOURCE RECORD LAYOUT

Element Number	Data Element	Record Position
1	State	1-2
2	County	3-6
3	Air Quality Control Region	7-9
4	Year	10-11
<u>Emission Estimates (100 tons)</u>		
5	Particulates	12-16
6	SO <sub>2</sub>	17-21
7	NO <sub>x</sub>	22-25
8	HC	26-30
9	CO	31-35
<u>Sulfur Content (%)</u>		
10	Anthracite coal	36-37
11	Bituminous coal	38-39
12	Distillate coal	40-41
13	Residual coal	42-43
14	Anthracite coal	44-46
15	Bituminous coal	47-49
<u>Residential Fuel</u>		
16	Anthracite coal (10 tons)	50-53
17	Bituminous coal (10 tons)	54-58
18	Distillate oil (10 <sup>4</sup> gal)	59-63
19	Residual oil (10 <sup>4</sup> gal)	64-68
20	Natural gas (10 <sup>7</sup> ft <sup>3</sup> )	69-73
21	Wood (10 <sup>2</sup> tons)	74-77
<u>Commercial and Institutional Fuel</u>		
22	Anthracite coal (10 tons)	78-82
23	Bituminous coal (10 tons)	83-87
24	Distillate oil (10 <sup>4</sup> gal)	88-92
25	Residual oil (10 <sup>4</sup> gal)	93-97
26	Natural gas (10 <sup>7</sup> ft <sup>3</sup> )	98-101
27	Wood (10 <sup>2</sup> tons)	102-103
<u>Industrial Fuel</u>		
28	Anthracite coal (10 tons)	104-109
29	Bituminous coal (10 tons)	110-115
30	Coke (10 tons)	116-119
31	Distillate oil (10 <sup>4</sup> gal)	120-124
32	Residual oil (10 <sup>4</sup> gal)	125-129
33	Natural gas (10 <sup>7</sup> ft <sup>3</sup> )	130-134
34	Wood (10 <sup>2</sup> tons)	135-137
35	Process gas (10 <sup>7</sup> ft <sup>3</sup> )	138-141
36	Filler	142-145
<u>On Site Incineration</u>		
37	Residential (10 tons)	146-151
38	Industrial (10 <sup>2</sup> tons)	152-156
39	Commercial Institutional (10 <sup>2</sup> tons)	157-160
<u>Open Burning</u>		
40	Residential (10 <sup>2</sup> tons)	161-166
41	Industrial (10 <sup>2</sup> tons)	167-172
42	Commercial Institutional (10 <sup>2</sup> tons)	173-178

TABLE II (CONT.)

Element Number	Data Element	Record Position
<u>Gasoline Fuel</u>		
43	Light vehicle ( $10^3$ gal)	179-185
44	Heavy vehicle ( $10^3$ gal)	186-190
45	Off hiway ( $10^3$ gal)	191-195
<u>Diesel Fuel</u>		
46	Heavy vehicle ( $10^3$ gal)	196-200
47	Off hiway ( $10^4$ gal)	201-203
48	Rail locomotive ( $10^4$ gal)	204-208
49	County population	209-212
50	Density Code	213
<u>Aircraft</u>		
51	Military (Landing takeoff cycles $10^2$ )	214-217
52	Civil (Landing takeoff cycles 10)	218-222
53	Commercial (Landing takeoff cycles 10)	223-227
<u>Vessels</u>		
54	Anthracite coal (10 tons)	228-231
55	Diesel oil ( $10^4$ gal)	232-235
56	Residual oil ( $10^4$ gal)	236-240
57	Gasoline ( $10^3$ gal)	241-244
<u>Evaporation</u>		
58	Solvent purchased (tons/yr)	245-250
59	Gasoline marketed ( $10^5$ gal)	251-255
<u>Measured Vehicle Miles</u>		
60	Limited access road ( $10^4$ miles)	256-261
61	Rural roads ( $10^4$ miles)	262-267
62	Suburban roads ( $10^4$ miles)	268-273
63	Urban roads ( $10^4$ miles)	274-280
64	Filler	281
65	Dirt Roads traveled ( $10^3$ miles)	282-288
66	Dirt air strips (landing takeoff cycles)	289-293
67	Construction land area ( $10^3$ acres)	294-298
68	Rocking handling & storing ( $10^3$ tons)	299-303
<u>Forest Fires</u>		
69	Area (acres)	304-310
70	Quantity (ton/acre)	311-313
<u>Slash Burning</u>		
71	Area (acres)	314-319
72	Quantity (tons/acre)	320-322
<u>Frost Control</u>		
73	Orchard heaters ( $10^2$ )	323-326
74	Days fired (days/yr)	327-329
75	Structured fires (#/yr)	330-333
<u>Coal Refuse Burning</u>		
76	Size of bank ( $10^2$ yards <sup>3</sup> )	334-339
77	Number/year	340-342
78	Filler	343-349
79	Comments	350-417
80	Record Level	418-420

TABLE III  
POINT SOURCE EMISSIONS POINT RECORD LAYOUT

Element Number	Data Element	Record Position
1	State	1-2
2	County	3-6
3	Air Quality Control Region	7-9
4	Plant number	10-13
5	Point ID	14-15
6	Year of record	16-17
7	SIC	18-21
8	IPP process	22-23
9	UTM EW Coord (km)	24-27
10	UTM NS Coord (km)	28-32
<u>Stack Data</u>		
11	Height (ft)	33-36
12	Diameter (ft)	37-39
13	Temperature ( $^{\circ}$ F)	40-43
14	Flow rate (ft <sup>3</sup> /min)	44-50
15	Plume height (ft)	51-54
16	Filler	55
17	Points with common stack	56-59
18	Filler	60-67
19	Boiler design capacity (10 <sup>6</sup> BTU/hr)	78-82
<u>Control Equipment</u>		
20	Primary particulate	83-85
21	Secondary particulate	86-88
22	Primary SO <sub>2</sub>	89-91
23	Secondary SO <sub>2</sub>	92-94
24	Primary NO <sub>x</sub>	95-97
25	Secondary NO <sub>x</sub>	98-100
26	Primary HC	101-103
27	Secondary HC	104-107
28	Primary CO	107-109
29	Secondary CO	110-112
<u>Estimated Control Efficiency (%)</u>		
30	Particulate	113-115
31	SO <sub>2</sub>	116-118
32	NO <sub>x</sub>	119-121
33	HC <sub>x</sub>	122-124
34	CO	125-127
35	Filler	128-137
<u>% Annual Thruput</u>		
36	Dec - Feb	138-139
37	Mar - May	140-141
38	Jun - Aug	142-143
39	Sep - Nov	144-145
<u>Normal Operating</u>		
40	Hrs/day	146-147
41	Days/week	148
42	Weeks/year	149-150
<u>Emission Estimates (tons/yr)</u>		
43	Particulate	151-157
44	SO <sub>2</sub>	158-164
45	NO <sub>x</sub>	165-171
46	HC	172-178
47	CO	179-185

TABLE III (CONT.)

Element Number	Data Element	Record Position
<u>Estimation Method</u>		
48	Particulate	186
49	SO <sub>2</sub>	187
50	NO <sub>x</sub>	188
51	HC	189
52	CO	190
53	% Space heat	191-193
54	Filler	194-197
<u>Allowable Emissions (tons/yr)</u>		
55	Particulate	198-204
56	SO <sub>2</sub>	205-211
57	NO <sub>x</sub>	212-218
58	HC	219-225
59	CO	226-232
60	Compliance status	233
<u>Compliance Schedule</u>		
61	Year	234-235
62	Month	236-237
<u>Compliance Status Update</u>		
63	Year	238-239
64	Month	240-241
65	Day	242-243
66	Emergency control action program	244
<u>Control Regulations</u>		
67	Reg 1	245-248
68	Reg 2	249-252
69	Reg 3	253-256
70	Filler	257
71	Record level	258-260

APPENDIX B  
EMS MIRADS Dictionary



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## MARSHALL INFORMATION RETRIEVAL AND DISPLAY SYSTEM (MIRADS) DICTIONARY FILE LISTING

PAGE 1

FILE NAME = EMS

FILE CODE = FMS1 RECORD SIZE = 39 BLOCK SIZE = 45 LEVELS = 3 FILE SECURITY =

RECORD TYPE CODE	DICTIONARY LEVEL CODE	START LOCATION	END LOCATION	RECORD SIZE
ACT	301	0045	0047	000008
EMP	201	0077	0079	000014
SOU	101	0189	0191	000032

K E Y	FIELD NAME	FIELD NUM	DICT LEVEL CODE	LOCATION START END	FIELD SIZE	T N	UP DATE	REPORT FIELD TITLE	NUMBER TITLE CHAR	REPORT FIELD SIZE	DEC I N	DATA O TYPE	SRCH TYPE	TABLE CODE	REPORT FIELD	
	*AGNCY	001	101	0001	0003	03	*	N	AGNCY	06	004	0 0	2	RG	01	015
	RGN-CNTY	002	101	0004	0007	04		N	RGN-CNTY	09	005	0 0	2	RG	02	010
	RGN	003	101	0004	0005	02	*	N	RGN	04	003	0 0	2	RG		
	CNTY	004	101	0006	0007	02	*	N	CNTY	05	003	0 0	2	RG		
	FCLTY	005	101	0008	0011	04		Y	FCLTY	06	005	0 0	2	RG		
	UTM	006	101	0012	0013	02		Y	UTM	04	003	0 0	2	RG		
	EW-COORU	007	101	0014	0019	06		Y	EW-COORU	09	007	0 0	2	RG		
	NS-COORU	008	101	0020	0025	06		Y	NS-COORU	09	007	0 0	2	RG		
	FCLTY-NM	009	101	0026	0050	25		Y	FCLTY-NAME	11	026	0 0	1	RG		
	CNTCT-ADDRS	010	101	0051	0070	20		Y	CONTACT ADDR	14	021	0 0	1	RG		
	CNTCT-CITY	011	101	0071	0085	15		Y	CONTACT CITY	13	016	0 0	1	RG		
	CNTCT-ST	012	101	0086	0087	02		Y	ST	03	003	0 0	1	RG		
	ZIP	013	101	0088	0092	05		Y	ZIP	04	006	0 0	2	RG		
	TLPHN	014	101	0093	0102	10		Y	TELEPHONE	10	011	0 0	2	RG		
	CNTCT	015	101	0103	0117	15		Y	CONTACT	08	016	0 0	1	RG		
	SIC	016	101	0118	0122	05	*	Y	SIC	04	006	0 0	1	RG		
	INSPCTR	017	101	0123	0125	03	*	Y	INSPCTR	08	004	0 0	1	RG	03	010
	ENGNR	018	101	0126	0128	03	*	Y	ENGNR	06	004	0 0	1	RG	03	010
	FCLTY-DESCRPT	019	101	0129	0153	25		Y	FCLTY DESCRIPTION	18	026	0 0	1	RG		
	FCLTY-ADDRS	020	101	0154	0173	20		Y	FCLTY ADDR	12	021	0 0	1	RG		
	FCLTY-CITY	021	101	0174	0188	15		Y	FCLTY CITY	11	016	0 0	1	RG		
	SOU	022	101	0189	0191	03		N	SOU	04	004	0 0	2	RG		
	AGNCY2	023	201	0001	0003	03		N	AGNCY	06	004	0 0	2	RG	01	015
	RGN-CNTY2	024	201	0004	0007	04		N	RGN CNTY	09	005	0 0	2	RG	02	010
	RGN2	025	201	0004	0005	02		N	RGN	04	003	0 0	2	RG		
	CNTY2	026	201	0006	0007	02		N	CNTY	05	003	0 0	2	RG		
	FCLTY2	027	201	0008	0011	04		N	FCLTY	06	005	0 0	1	RG		
	PRMT2	028	201	0012	0015	04		N	PRMT	05	005	0 0	1	RG		
	EM-PT-DSCK	029	201	0016	0040	25		N	EMISSION POINT	15	026	0 0	1	RG		
	CNTL-DVC	030	201	0041	0060	20		N	CONTROL DEVICE	15	021	0 0	1	RG		
	PLLNT	031	201	0061	0076	16		N	POLLUTANTS	11	017	0 0	1	RG		
	EMP	032	201	0077	0079	03		N	EMP	04	004	0 0	2	RG		
	AGNCY3	033	301	0001	0003	03		N	AGNCY	06	004	0 0	2	RG	01	015
	RGN-CNTY3	034	301	0004	0007	04		N	RGN-CNTY	09	005	0 0	2	RG	02	010
	RGN3	035	301	0004	0005	02		N	RGN	04	003	0 0	2	RG		
	CNTY3	036	301	0006	0007	02		N	CNTY	05	003	0 0	2	RG		
	FCLTY3	037	301	0008	0011	04		N	FCLTY	06	005	0 0	1	RG		

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B-1

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## MARSHALL INFORMATION RETRIEVAL AND DISPLAY SYSTEM (MIRADS) DICTIONARY FILE LISTING

PAGE 2

FILE NAME = EMS

FILE CODE = FMS1 RECORD SIZE =

39 BLOCK SIZE =

45 LEVELS = 3 FILE SECURITY =

K E Y	FIELD NAME	FIELD DICT NUM LEVEL CODE	LOCATION START END	FIELD I SIZE N DATE	UP DATE	REPORT FIELD TITLE	NUMBER TITLE CHAR	REPORT FIELD SIZE	DEC I O N	DATA TYPE	SRCH TYPE	TABLF CODE	REPORT FIELD
	PRMT3	038 301	0012 0015	04	N	PRMT	05	005	0 0	1	RG		
	ACTN	039 301	0016 0017	02	Y	ACTN	05	003	0 0	1	RG	04	016
	SCHDL	040 301	0018 0023	06	N	SCHDL	07	007	0 0	2	RG		
	SYM	041 301	0018 0021	04 *	Y	SYM	04	005	0 0	2	RG		
	PRFRMD	042 301	0024 0029	06	N	PRFRMD	07	007	0 0	2	RG		
	PYM	043 301	0024 0027	04 *	Y	PYM	04	005	0 0	2	RG		
	STAFF	044 301	0030 0032	03 *	Y	STAFF	06	004	0 0	1	RG	03	010
	RSLTS	045 301	0033 0034	02	Y	RSLTS	06	003	0 0	1	RG		
	NXT-ACTN	046 301	0035 0036	02 *	Y	NXT ACTN	09	003	0 0	1	RG	04	016
	LTTR	047 301	0037 0038	02	Y	LTTR	05	003	0 0	2	RG		
	FUTURE	048 301	0039 0044	06	N	FUTURE	07	007	0 0	2	RG		
	FYM	049 301	0039 0042	04 *	Y	FYM	04	005	0 0	2	RG		
	ACT	050 301	0045 0047	03 *	N	ACT	04	004	0 0	0	RG		

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TABLE CODE	ARGUMENT	FUNCTION	TABLE CODE	ARGUMENT	FUNCTION
01	010	STATE	02	0403	CHILTON
01	011	STATE SAW MILLS	02	0404	FAYETTE
01	012	STATE GINS	02	0405	GREEN
01	013	STATE INCNRTRS	02	0406	HALE
02	0101	CHUCTAW	02	0407	JEFFERSON
02	0102	CLARKE	02	0408	LAMAR
02	0103	CONECUH	02	0409	PICKENS
02	0104	DALLAS	02	0410	
02	0105	MARENGO	02	0411	SHELBY
02	0106	MONROE	02	0412	SUMTER
02	0107	PERRY	02	0413	TUSCALOOSA
02	0108	WASHINGTON	02	0414	WALKER
02	0109	WILCOX	02	0501	BALDWIN
02	0201	AUTAUGA	02	0502	ESCAMBIA
02	0202	BULLOCK	02	0503	MOBILE
02	0203	BUTLER	02	0601	BARBOUR
02	0204	CRENSHAW	02	0602	COFFEE
02	0205	ELMORE	02	0603	COVINGTON
02	0206	LEE	02	0604	DALE
02	0207	LOWNDES	02	0605	GENEVA
02	0208	MACON	02	0606	HENRY
02	0209	MONTGOMERY	02	0607	HOUSTON
02	0210	PIKE	02	0701	COLBERT
02	0211	RUSSELL	02	0702	CULLMAN
02	0301	CALHOUN	02	0703	DEKALB
02	0302	CHAMBERS	02	0704	FRANKLIN
02	0303	CHEROKEE	02	0705	JACKSON
02	0304	CLAY	02	0706	LAUDERDALE
02	0305	CLERBURN	02	0707	LAWRENCE
02	0306	COOSA	02	0708	LIMESTONE
02	0307	ETOWAH	02	0709	MADISON
02	0308	RANDOLPH	02	0710	MARION
02	0309	TALLADEGA	02	0711	MARSHALL
02	0310	TALLAPOOSA	02	0712	MORGAN
02	0401	BIBB	02	0713	WINSTON
02	0402	BLOUNT			

TABLE CODE	ARGUMENT	FUNCTION
03	F01	JENKINS
03	F02	LEDREITER
03	F03	NICHOLS
03	F04	OWEN
03	F05	SMITH
03	F06	WELLS
03	F07	SHOOKMAN
03	F08	SEAY
03	P01	BARRETT
03	P02	BRYANT
03	P04	LEDREITER
03	P06	NICHOLS
03	P07	OWEN
03	P08	ROBERTSON
03	P09	SMITH
03	P11	WELLS
03	P12	COOPER
03	P13	JENKINS
03	P15	GOLSON
03	P17	SAPPINGTON
03	P18	WATKINS
03	P19	GORE
03	P20	HARDY
03	S01	HOFFMANN
03	S03	RELMOND
03	S04	SANDERS
03	S05	SWEAT
03	S06	ALEXANDER
03	S08	MCNIDER
03	S10	MORGAN
03	S11	SPURGIN
03	S12	PHILLIPS
03	S13	RICHEY
03	S14	WILSON
03	S15	RUGGLES

TABLE CODE	ARGUMENT	FUNCTION
04		
04	01	INSPECTION
04	02	REGISTRATION
04	03	PLAN SUBMISSION
04	04	PLAN REVIEW
04	05	REV W/SOURCE
04	06	CONTRIS AWARDED
04	07	INIT CONST/MOD
04	08	COMP CONST/MOD
04	09	COMPLETE COMPL
04	10	SOURCE TESTING
04	11	AQ SURVEY
04	12	EMISSIONS INVT
04	13	PERIODIC REPORT
04	14	COMPLAINT
04	15	OTHER
04	16	ISSUE COND PRMT
04	17	ISSUE CONS PRMT
04	18	ISSUE TEMP PRMT
04	19	ISSUE OPRN PRMT
04	20	PUBLIC HEARING
04	21	ENGR FEAS STUDY
04	22	PUB COMMENT PRD
04	23	BEGIN OPERATION
04	24	PRMT EXPIRATION
04	25	CEASE OPERATION
04	26	LEGAL ACTION
04	27	VIS EMIS READIN
04	28	FIELD PATROL
04	29	ON SITE CORRECTN
04	30	NOTICE OF VIOLATN
04	35	VARNCE APPRVD
04	37	VARNCE PER BEGINS
04	38	VARNCE PER EXPIRES
04	42	RESUME OP
04	43	EXTENSN REQSTD
04	44	VAR PETITION SUB
04	45	COMPL TEST RPT REC
04	99	ACTION OMITTED

APPENDIX C  
EIS MIRADS Dictionary

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## MARSHALL INFORMATION RETRIEVAL AND DISPLAY SYSTEM (MIRADS) DICTIONARY FILE LISTING

PAGE 1

FILE NAME = EIS

FILE CODE = NEDS RECORD SIZE = 70 BLOCK SIZE = 25 LEVELS = 4 FILE SECURITY =

		RECORD TYPE CODE		DICTIONARY LEVEL CODE		START LOCATION		END LOCATION		RECORD SIZE					
		101		101		0418		0420		000070					
		201		201		0418		0420		000070					
		301		301		0418		0420		000070					
		401		401		0418		0420		000070					
X E Y	FIELD NAME	FIELD NUM	DICT LEVEL CODE	LOCATION START	FIELD END	I SIZE	UP N DATE	REPORT FIELD TITLE	NUMBER TITLE CHAR	REPORT FIELD SIZE	DEC I 0 N	DATA TYPE	SRCH TYPE	TABLE	
														CODE	REPORT FIELD
	*ST	001	101	0001	0002	02	N	STATE	06	003	0 0	1	RG		
	CNTY	002	101	0003	0006	04	N	COUNTY	07	005	0 0	1	RG	06	014
	ACCR	003	101	0007	0009	03	N	ACCR	05	004	0 0	1	RG	05	011
	YR	004	101	0010	0011	02	Y	YR	03	003	0 0	1	RG		
	PART	005	101	0012	0016	05	Y	EMSSN PART	11	006	0 0	2	RG		
	SO2	006	101	0017	0021	05	Y	EMSSN SO2	10	006	0 0	2	RG		
	NOX	007	101	0022	0025	04	Y	EMSSN NOX	10	005	0 0	2	RG		
	HC	008	101	0026	0030	05	Y	EMSSN HC	09	006	0 0	2	RG		
	CO	009	101	0031	0035	05	Y	EMSSN CO	09	006	0 0	2	RG		
	ANTH=5	010	101	0036	0037	02	Y	%S ANTH COAL	13	005	0 1	2	RG		
	BITUM=5	011	101	0038	0039	02	Y	%S BITUM COAL	14	005	0 1	2	RG		
	DIST=5	012	101	0040	0041	02	Y	%S DIST OIL	12	005	0 1	2	RG		
	RESID=5	013	101	0042	0043	02	Y	%S RESID OIL	13	005	0 1	2	RG		
	ANTH=ASH	014	101	0044	0046	03	Y	%ASH ANTH COAL	16	006	0 1	2	RG		
	BITUM=ASH	015	101	0047	0049	03	Y	%ASH BITUM COAL	16	006	0 1	2	RG		
	ANTH=RF	016	101	0050	0053	04	Y	RESNDTL ANTH	13	005	0 0	2	RG		
	BITUM=RF	017	101	0054	0058	05	Y	RESNDTL BITUM	14	006	0 0	2	RG		
	DIST=RF	018	101	0059	0063	05	Y	RESNDTL DIST OIL	17	006	0 0	2	RG		
	RESID=RF	019	101	0064	0068	05	Y	RESNDTL RESID OIL	18	006	0 0	2	RG		
	NAT=GAS=RF	020	101	0069	0073	05	Y	RESNDTL NAT GAS	16	006	0 0	2	RG		
	WOOD=RF	021	101	0074	0077	04	Y	RESNDTL WOOD	13	005	0 0	2	RG		
	ANTH=CIF	022	101	0078	0082	05	Y	CHMRCL+INSTNTL ANTH	20	006	0 0	2	RG		
	BITUM=CIF	023	101	0083	0087	05	Y	CHMRCL+INSTNTL BITUM	21	006	0 0	2	RG		
	DIST=CIF	024	101	0088	0092	05	Y	CHMRCL+INSTNTL DIST OIL	24	006	0 0	2	RG		
	RESID=CIF	025	101	0093	0097	05	Y	CHMRCL+INSTNTL RESID OIL	25	006	0 0	2	RG		
	NAT=GAS=CIF	026	101	0098	0101	04	Y	CHMRCL+INSTNTL NAT GAS	23	005	0 0	2	RG		
	WOOD=CIF	027	101	0102	0103	02	Y	CHMRCL+INSTNTL WOOD	20	003	0 0	2	RG		
	ANTH=IF	028	101	0104	0109	06	Y	INDSTRL ANTH	13	007	0 0	2	RG		
	BITUM=IF	029	101	0110	0115	06	Y	INDSTRL BITUM	14	007	0 0	2	RG		
	COKE=IF	030	101	0116	0119	04	Y	INDSTRL COKE	13	005	0 0	2	RG		
	DIST=IF	031	101	0120	0124	05	Y	INDSTRL DIST OIL	17	006	0 0	2	RG		
	RESID=IF	032	101	0125	0129	05	Y	INDSTRL RESID OIL	18	006	0 0	2	RG		
	NAT=GAS=IF	033	101	0130	0134	05	Y	INDSTRL NAT GAS	16	006	0 0	2	RG		
	WOOD=IF	034	101	0135	0137	03	Y	INDSTRL WOOD	13	004	0 0	2	RG		
	PRO=GAS=IF	035	101	0138	0141	04	Y	INDSTRL PROCESS GAS	20	005	0 0	2	RG		
	DUMMY1	036	101	0142	0145	04	Y	DUMMY1	07	005	0 0	2	RG		

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## MARSHALL INFORMATION RETRIEVAL AND DISPLAY SYSTEM (MIRA) DICTIONARY FILE LISTING

PAGE 2

FILE NAME = EIS

FILE CODE = NED5 RECORD SIZE = 70 BLOCK SIZE = 25 LEVELS = 4 FILE SECURITY =

K	FIELD	FIELD DICT	LOCATION	FIELD I	UP	REPORT FIELD TITLE	NUMBER	REPORT	DEC	DATA	SRCH	TABLE	
E	NAME	NUM	LEVEL	START	END	SIZE	N	DATE					
Y		CODE					D						
									CHAR	SIZE	N	FIELD	
	RES=INC	037	101	0146	0151	06	Y	INCNRTRS RESNDTL	17	007	0 0	2	RG
	IND=INC	038	101	0152	0156	05	Y	INCNRTRS INDUSTRL	17	006	0 0	2	RG
	COMM=INC	039	101	0157	0160	04	Y	INCNRTRS CHMRCL+INSTNTL	24	005	0 0	2	RG
	RES=OB	040	101	0161	0166	06	Y	OPEN BURN RESNDTL	18	007	0 0	1	RG
	IND=OB	041	101	0167	0172	06	Y	OPEN BURN INDUSTRL	18	007	0 0	1	RG
	COMM=OB	042	101	0173	0178	06	Y	OPEN BURN CHMRCL+INSTNTL	25	007	0 0	1	RG
	LVEH=GAS	043	101	0179	0185	07	Y	GAS LIGHT VEH	14	008	0 0	1	RG
	HVEH=GAS	044	101	0186	0190	05	Y	GAS HEAVY VEH	14	006	0 0	1	RG
	OHINY=GAS	045	101	0191	0195	05	Y	GAS OFF HIWAY VEH	18	006	0 0	1	RG
	HVEH=DSL	046	101	0196	0200	05	Y	DIESEL HEAVY VEH	17	006	0 0	1	RG
	OHINY=DSL	047	101	0201	0203	03	Y	DIESEL OFF HIWAY VEH	21	004	0 0	1	RG
	RAIL=DSL	048	101	0204	0208	05	Y	DIESEL RAIL	12	006	0 0	1	RG
	POP	049	101	0209	0212	04	Y	POPULATN	09	005	0 0	1	RG
	DNSTY	050	101	0213	0213	01	Y	DENSITY CODE	13	002	0 0	1	RG
	HIL=AIR	051	101	0214	0217	04	Y	AIRCFT HIL	11	005	0 0	1	RG
	CIVIL=AIR	052	101	0218	0222	05	Y	AIRCFT CIVIL	13	006	0 0	1	RG
	COMM=AIR	053	101	0223	0227	05	Y	AIRCFT CHMRCL	14	006	0 0	1	RG
	ANTH=VSLs	054	101	0228	0231	04	Y	VESSEL ANTH	12	005	0 0	1	RG
	DSL=VSLs	055	101	0232	0235	04	Y	VESSEL DIESEL	14	005	0 0	1	RG
	RESID=VSLs	056	101	0236	0240	05	Y	VESSEL RESID OIL	17	006	0 0	1	RG
	GAS=VSLs	057	101	0241	0244	04	Y	VESSEL GAS	11	005	0 0	1	RG
	SOLVNT-PRCHD	058	101	0245	0250	06	Y	EVAPORATN SOL PUR	18	007	0 0	1	RG
	GAS=HRKTD	059	101	0251	0255	05	Y	EVAPORATN GAS HRKTD	20	006	0 0	1	RG
	LMTD=ACC-RD	060	101	0256	0261	06	Y	VEH MILES LMTD ACCS	20	007	0 0	1	RG
	RURL=RD	061	101	0262	0267	06	Y	VEH MILES RURL	15	007	0 0	1	RG
	SBRBN=RD	062	101	0268	0273	06	Y	VEH MILES SUBURBN	18	007	0 0	1	RG
	URBN=RD	063	101	0274	0280	07	Y	VEH MILES URBN	15	008	0 0	1	RG
	DUMMY2	064	101	0281	0281	01	Y	DUMMY2	07	002	0 0	1	RG
	DRT=RD	065	101	0282	0288	07	Y	DIRT RDS	09	008	0 0	1	RG
	DRT=AIR=STRP	066	101	0289	0293	05	Y	DIRT AIR STMPs	15	006	0 0	1	RG
	CNST=AR	067	101	0294	0298	05	Y	CNSTRCTN LAND	14	006	0 0	1	RG
	RCK=HNDL=STR	068	101	0299	0303	05	Y	ROCK HNDLNG+STRG	17	006	0 0	1	RG
	FRST=FRS=AC	069	101	0304	0310	07	Y	FOREST FIRES AREA	18	008	0 0	1	RG
	FRST=FRS=QN	070	101	0311	0313	03	Y	FOREST FIRES QUANT/ACRE	24	004	0 0	1	RG
	SLSH=BRN=AC	071	101	0314	0319	06	Y	SLASH BURNG AREA	17	007	0 0	1	RG
	SLSH=BRN=QN	072	101	0320	0322	03	Y	SLASH BURNG QUANT/ACRE	23	004	0 0	1	RG
	FROST=HTR	073	101	0323	0326	04	Y	ORCHARD HEATRS	15	005	0 0	1	RG
	FROST=DYS=FR	074	101	0327	0329	03	Y	DYS HEATRS FIRED	17	006	0 1	2	RG
	STRCTR=FRS	075	101	0330	0333	04	Y	STRCTR FIRES	13	005	0 0	1	RG
	CL=KFS=SZ	076	101	0334	0339	06	Y	COAL REFUSE BURNG SIZE	23	007	0 0	1	RG
	CL=KFS=NR	077	101	0340	0342	03	Y	COAL REFUSE BURNG NR/YR	24	004	0 0	1	RG
	DUMMY3	078	101	0343	0349	07	Y	DUMMY3	07	008	0 0	1	RG
	CHHNTS	079	101	0350	0417	68	Y	CHHNTS	07	069	0 0	1	RG
	LV1	080	101	0418	0420	03	Y	LEVEL1	07	004	0 0	1	RG
	ST1	081	201	0001	0002	02	Y	STATE	06	003	0 0	1	RG

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## MARSHALL INFORMATION RETRIEVAL AND DISPLAY SYSTEM (MIRADS) DICTIONARY FILE LISTING

PAGE 3

FILE NAME = EIS

FILE CODE = NEDS RECORD SIZE = 70 BLOCK SIZE = 25 LEVELS = 4 FILE SECURITY =

K	FIELD	FIELD DICT	LOCATION	FIELD	UP	REPORT	FIELD	TITLE	NUMBER	REPORT	DEC	DATA	SRCH	TABLE		
E	NAME	NUM	LEVEL	START	END	SIZE	N	DATE	TITLE	FIELD	I	O	TYPE	TYPE	CODE	REPORT
Y		CODE							CHAR	SIZE	N					FIELD
	CNTY1	082	201	0003	0006	04	•	Y	COUNTY	07	005	0	0	1	RG	06 014
	AQCR1	083	201	0007	0009	03	•	Y	AQCR	05	004	0	0	1	RG	05 011
	PLNT-ID	084	201	0010	0013	04	•	Y	PLANT	06	005	0	0	1	RG	
	DUMHY11	085	201	0014	0017	04		Y	DUMHY11	08	005	0	0	1	RG	
	UTH	086	201	0018	0019	02		Y	UTH	04	003	0	0	1	RG	
	YR1	087	201	0020	0021	02		Y	YEAR	05	003	0	0	1	RG	
	PLNT-NH	088	201	0022	0061	40		Y	PLANT NAME AND ADDRESS	23	041	0	0	1	RG	
	PLNT-CNTCT	089	201	0062	0073	12		Y	CONTACT	08	013	0	0	1	RG	
	OWN	090	201	0074	0074	01		Y	OWNER	06	002	0	0	1	RG	01 011
	CTY	091	201	0075	0078	04		Y	CTY	04	005	0	0	1	RG	
	LV2	092	201	0418	0420	03		N	LEVEL2	07	004	0	0	1	RG	
	ST2	093	301	0001	0002	02		N	STATE	06	003	0	0	1	RG	
	CNTY2	094	301	0003	0006	04		N	COUNTY	07	005	0	0	1	RG	
	AQCR2	095	301	0007	0009	03		N	AQCR	05	004	0	0	1	RG	
	PLNT-ID2	096	301	0010	0013	04		N	PLANT	06	005	0	0	1	RG	
	PNT	097	301	0014	0015	02		N	POINT	06	003	0	0	1	RG	
	YR2	098	301	0016	0017	02		Y	YR	03	003	0	0	1	RG	
	SIC	099	301	0018	0021	04	•	Y	SIC	04	005	0	0	1	RG	
	IPP	100	301	0022	0023	02		Y	IPP PROCESS	12	003	0	0	1	RG	
	HRZNTL	101	301	0024	0027	04		Y	EW COORD	09	007	0	1	2	RG	
	VRTL	102	301	0028	0032	05		Y	NS COORD	09	008	0	1	2	RG	
	STCK-HT	103	301	0033	0036	04		Y	STACK HT	09	005	0	0	2	RG	
	STCK-DIA	104	301	0037	0039	03		Y	STACK DIA	10	004	0	0	2	RG	
	STCK-TEMP	105	301	0040	0043	04		Y	STACK TEMP	11	005	0	0	2	RG	
	STCK-FLOW	106	301	0044	0050	07		Y	STACK FLOW RATE	16	008	0	0	2	RG	
	PLM-HT	107	301	0051	0054	04		Y	PLUME HT	09	005	0	0	2	RG	
	DUMHY5	108	301	0055	0055	01		Y	DUMHY5	07	002	0	0	1	RG	
	PTS-CHNN	109	301	0056	0059	04		Y	PTS WITH COMMON STACK	22	005	0	0	1	RG	
	DUMHY6	110	301	0060	0077	18		Y	DUMHY6	07	019	0	0	1	RG	
	BLR-CPCTY	111	301	0078	0082	05		Y	BOILER DESIGN CAP	18	006	0	0	1	RG	
	CNTL-PPART	112	301	0083	0085	03		Y	CNTL EQUIP PRIM PART	21	004	0	0	1	RG	02 027
	CNTL-SPART	113	301	0086	0088	03		Y	CNTL EQUIP SEC PART	20	004	0	0	1	RG	02 027
	CNTL-PSO2	114	301	0089	0091	03		Y	CNTL EQUIP PRIM SO2	20	004	0	0	1	RG	02 027
	CNTL-SSO2	115	301	0092	0094	03		Y	CNTL EQUIP SEC SO2	20	004	0	0	1	RG	02 027
	CNTL-PNOX	116	301	0095	0097	03		Y	CNTL EQUIP PRIM NOX	20	004	0	0	1	RG	02 027
	CNTL-SNOX	117	301	0098	0100	03		Y	CNTL EQUIP SEC NOX	19	004	0	0	1	RG	02 027
	CNTL-PHC	118	301	0101	0103	03		Y	CNTL EQUIP PRIM HC	19	004	0	0	1	RG	02 027
	CNTL-SHC	119	301	0104	0106	03		Y	CNTL EQUIP SEC HC	18	004	0	0	1	RG	02 027
	CNTL-PCO	120	301	0107	0109	03		Y	CNTL EQUIP PRIM CO	19	004	0	0	1	RG	
	CNTL-SCO	121	301	0110	0112	03		Y	CNTL EQUIP SEC CO	18	004	0	0	1	RG	
	EFFNCY-PART	122	301	0113	0115	03		Y	CNTL EFFNCY PART	17	006	0	1	2	RG	
	EFFNCY-SO2	123	301	0116	0118	03		Y	CNTL EFFNCY SO2	16	006	0	1	2	RG	
	EFFNCY-NOX	124	301	0119	0121	03		Y	CNTL EFFNCY NOX	16	006	0	1	2	RG	
	EFFNCY-HC	125	301	0122	0124	03		Y	CNTL EFFNCY HC	15	006	0	1	2	RG	
	EFFNCY-CO	126	301	0125	0127	03		Y	CNTL EFFNCY CO	15	006	0	1	2	RG	

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## MARSHALL INFORMATION RETRIEVAL AND DISPLAY SYSTEM (MIRADS) DICTIONARY FILE LISTING

PAGE 4

FILE NAME = EIS FILE CODE = NEDS RECORD SIZE = 70 BLOCK SIZE = 25 LEVELS = 4 FILE SECURITY =

K	FIELD	FIELD DICT	LOCATION	FIELD 1	UP	REPORT FIELD TITLE	NUMBER	REPORT	DEC	DATA	SRCH	TABLE
E	NAME	NUM LEVEL	START END	SIZE	N DATE		TITLE	FIELD	I O	TYPE	TYPE	CODE REPORT
Y		CODE			D		CHAR	SIZE	N			FIELD
	DUMMY7	127	301	0128 0137	10	Y DUMMY7	07	011	0 0	1	RG	
	THRPT-DF	128	301	0138 0139	02	Y THRPT-DF	17	003	0 0	2	RG	
	THRPT-MM	129	301	0140 0141	02	Y THRPT-MM	17	003	0 0	2	RG	
	THRPT-JA	130	301	0142 0143	02	Y THRPT-JA	18	003	0 0	2	RG	
	THRPT-SN	131	301	0144 0145	02	Y THRPT-SN	18	003	0 0	2	RG	
	OPRTN-HRS	132	301	0146 0147	02	Y OPRTN-HRS	16	003	0 0	2	RG	
	OPRTN-OYS	133	301	0148 0149	01	Y OPRTN-OYS	16	002	0 0	2	RG	
	OPRTN-WKS	134	301	0149 0150	02	Y OPRTN-WKS	16	003	0 0	2	RG	
	EMSSN-PART	135	301	0151 0157	07	Y EMSSN-PART	15	008	0 0	2	RG	
	EMSSN-SO2	136	301	0158 0164	07	Y EMSSN-SO2	14	008	0 0	2	RG	
	EMSSN-NOX	137	301	0165 0171	07	Y EMSSN-NOX	14	008	0 0	2	RG	
	EMSSN-HC	138	301	0172 0178	07	Y EMSSN-HC	13	008	0 0	2	RG	
	EMSSN-CO	139	301	0179 0185	07	Y EMSSN-CO	13	008	0 0	2	RG	
	HTHU-PART	140	301	0186 0186	01	Y HTHU-PART	16	002	0 0	1	RG	
	HTHU-SO2	141	301	0187 0187	01	Y HTHU-SO2	15	002	0 0	1	RG	
	HTHU-NOX	142	301	0188 0188	01	Y HTHU-NOX	15	002	0 0	1	RG	
	HTHU-HC	143	301	0189 0189	01	Y HTHU-HC	14	002	0 0	1	RG	
	HTHU-CO	144	301	0190 0190	01	Y HTHU-CO	14	002	0 0	1	RG	
	SPACE-HT	145	301	0191 0193	03	Y SPACE-HT	12	006	0 1	1	RG	
	DUMMY8	146	301	0194 0197	04	Y DUMMY8	07	005	0 0	1	RG	
	ALLOW-PART	147	301	0198 0204	07	Y ALLOW-PART	17	008	0 0	2	RG	
	ALLOW-SO2	148	301	0205 0211	07	Y ALLOW-SO2	16	008	0 0	2	RG	
	ALLOW-NOX	149	301	0212 0218	07	Y ALLOW-NOX	16	008	0 0	2	RG	
	ALLOW-HC	150	301	0219 0225	07	Y ALLOW-HC	15	008	0 0	2	RG	
	ALLOW-CO	151	301	0226 0232	07	Y ALLOW-CO	15	008	0 0	2	RG	
	COMPL-STAT	152	301	0233 0233	01	Y COMPL-STAT	16	002	0 0	1	RG	
	CHPLNC-SCH	153	301	0234 0237	04	Y CHPLNC-SCH	16	005	0 0	1	RG	
	CHPLNC-YR	154	301	0234 0235	02	Y CHPLNC-YR	12	003	0 0	1	RG	
	CHPLNC-MO	155	301	0236 0237	02	Y CHPLNC-MO	12	003	0 0	1	RG	
	CHPLNC-UPDT	156	301	0238 0243	06	Y CHPLNC-UPDT	23	007	0 0	1	RG	
	UPDT-YR	157	301	0238 0239	02	Y UPDT-YR	19	003	0 0	1	RG	
	UPDT-MO	158	301	0240 0241	02	Y UPDT-MO	19	003	0 0	1	RG	
	UPDT-DY	159	301	0242 0243	02	Y UPDT-DY	19	003	0 0	1	RG	
	ECAP	160	301	0244 0244	01	Y ECAP	05	002	0 0	1	RG	
	REG1	161	301	0245 0248	04	Y REG1	15	005	0 0	1	RG	
	REG2	162	301	0249 0252	04	Y REG2	15	005	0 0	1	RG	
	REG3	163	301	0253 0256	04	Y REG3	15	005	0 0	1	RG	
	DUMMY9	164	301	0257 0257	01	Y DUMMY9	07	002	0 0	1	RG	
	LV3	165	301	0418 0420	03	Y LV3	07	004	0 0	1	RG	
	ST3	166	401	0001 0002	02	N ST3	06	003	0 0	1	RG	
	CNTY3	167	401	0003 0006	04	N CNTY3	07	005	0 0	1	RG	06 014
	AQCR3	168	401	0007 0009	03	N AQCR3	05	004	0 0	1	RG	05 011
	PLNT-103	169	401	0010 0013	04	N PLNT-103	06	005	0 0	1	RG	
	PNT3	170	401	0014 0015	02	N PNT3	06	003	0 0	1	RG	
	YR3	171	401	0016 0017	02	Y YR3	03	003	0 0	1	RG	

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## MARSHALL INFORMATION RETRIEVAL AND DISPLAY SYSTEM (MIRADS) DICTIONARY FILE LISTING

PAGE 5

FILE NAME = EIS

FILE CODE = NED5

RECORD SIZE =

70

BLOCK SIZE =

25

LEVELS =

4

FILE SECURITY =

K	FIELD	FIELD	DICT	LOCATION	FIELD	UP	REPORT	FIELD	TITLE	NUMBER	REPORT	DEC	DATA	SRCH	TABLE
E	NAME	NUM	LEVEL	START	END	SIZE	N	DATE		TITLE	FIELD	1	0	TYPE	TYPE
Y		CODE					D			CHAR	SIZE	N			CODE
	SCC1	172	401	0018	0018	01	Y	SCC 1		06	002	0	0	1	RG
	SCC2	173	401	0019	0020	02	Y	SCC 2		06	003	0	0	1	RG
	SCC3	174	401	0021	0023	03	Y	SCC 3		06	004	0	0	1	RG
	SCC4	175	401	0024	0025	02	Y	SCC 4		06	003	0	0	1	RG
	OPRTNG-RT	176	401	0026	0032	07	Y	OPRTNG RATE		13	008	0	0	1	RG
	DSGN-RT	177	401	0033	0039	07	Y	MAX DESIGN RATE		16	012	0	3	2	RG
	S-CNTNT	178	401	0040	0042	03	Y	%S		03	007	0	2	2	RG
	ASH-CNTNT	179	401	0043	0045	03	Y	%ASH		05	006	0	1	2	RG
	HEAT-CNTNT	180	401	0046	0050	05	Y	HEAT CONTENT		13	006	0	0	1	RG
	COMHNT	181	401	0051	0070	20	Y	COMMENTS		09	021	0	0	1	RG
	SORCE	182	401	0071	0071	01	Y	SOURCE		07	002	0	0	1	RG
	CONFID	183	401	0072	0072	01	Y	CONFIDENTIAL		13	002	0	0	1	RG
	DUMHY10	184	401	0073	0077	05	Y	DUMHY10		08	006	0	0	1	RG
	LV4	185	401	0418	0420	03	Y	LEV4		05	004	0	0	1	RG

03 011

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## TABLE CODE

## ARGUMENT

## FUNCTION

06	1380	FLORALA	06	2000	LAFAYETTE
06	1400	FLORENCE	06	2020	LAMAR
06	1420	FOLEY	06	2040	LANETT
06	1425	FORESTDALE	06	2060	LANGDALE
06	1430	FORT MCCLELLAN	06	2080	LAUDERDALE
06	1440	FORT PAYNE	06	2100	LAWRENCE
06	1450	FORT RUCKER	06	2120	LEE
06	1460	FRANKLIN	06	2140	LEEDS
06	1470	FULTONDALE	06	2160	LIMESTONE
06	1480	GADSDEN	06	2180	LINDEN
06	1500	GARDENDALE	06	2200	LIPSCOMB
06	1520	GENEVA	06	2210	LITTLE SHAWMUT
06	1540	GENEVA	06	2220	LOWNDES
06	1560	GLENCOE	06	2240	MACON
06	1580	GRAYSVILLE	06	2255	MADISON
06	1600	GREENE	06	2260	MADISON
06	1620	GREENSBORO	06	2280	MARENGO
06	1640	GREENVILLE	06	2300	MARION
06	1680	GUNTERVILLE	06	2320	MARION
06	1700	HALE	06	2340	MARSHALL
06	1720	HALEYVILLE	06	2360	MIDFIELD
06	1727	HAMILTON	06	2380	MOBILE
06	1734	HARTFORD	06	2400	MOBILE
06	1740	HARTSELLE	06	2420	MONROE
06	1760	HEADLAND	06	2440	MONROEVILLE
06	1770	HEFLIN	06	2460	MONTGOMERY
06	1780	HENRY	06	2480	MONTGOMERY
06	1800	HOMEWOOD	06	2500	MONTEVALLO
06	1820	HOUSTON	06	2520	MORGAN
06	1840	HUEYTOWN	06	2540	MOUNTAINBROOK
06	1860	HUNTSVILLE	06	2560	MUSCLE SHOALS
06	1880	IRONDALE	06	2580	NORTHPORT
06	1900	JACKSON	06	2600	ONEONTA
06	1920	JACKSON	06	2620	OPELIKA
06	1940	JACKSONVILLE	06	2640	OPP
06	1960	JASPER	06	2660	OXFORD
06	1980	JEFFERSON	06	2680	OZARK
			06	2700	PELL CITY
			06	2720	PERRY

TABLE CODE	ARGUMENT	FUNCTION
06		06
06	0020	06
06	0030	06
06	0040	06
06	0060	06
06	0080	06
06	0100	06
06	0120	06
06	0130	06
06	0140	06
06	0160	06
06	0180	06
06	0200	06
06	0220	06
06	0240	06
06	0260	06
06	0280	06
06	0300	06
06	0320	06
06	0340	06
06	0360	06
06	0380	06
06	0400	06
06	0420	06
06	0430	06
06	0440	06
06	0460	06
06	0480	06
06	0500	06
06	0520	06
06	0540	06
06	0560	06
06	0570	06
06	0580	06
06	0600	06
06	0620	06
06	0640	06
		0660
		0680
		0700
		0720
		0740
		0760
		0780
		0800
		0820
		0840
		0860
		0880
		0900
		0920
		0940
		0960
		0980
		0990
		1000
		1020
		1040
		1060
		1080
		1100
		1120
		1140
		1160
		1180
		1200
		1220
		1240
		1260
		1280
		1300
		1320
		1340
		1360

ABBEVILLE  
 ALABASTER  
 ALBERTVILLE  
 ALEXANDER CITY  
 ALICEVILLE  
 ANDALUSIA  
 ANNISTON  
 ANNISTON NW  
 ARAB  
 ATHENS  
 ATMORE  
 ATTALLA  
 AUBURN  
 AUTAUGA  
 BALDWIN  
 BARBOUR  
 BAY MINETTE  
 BAYOU LA BATRE  
 BESSEMER  
 BIBBS  
 BIRMINGHAM  
 BLOUNT  
 BOAZ  
 BLUFF PARK  
 BREWTON  
 BRIDGEPORT  
 BRIGHTON  
 BRUNSDIDGE  
 BULLOCK  
 BUTLER  
 CALHOUN  
 CENTER POINT  
 CHAMBERS  
 CHEROKEE  
 CHICKASAW  
 CHILDERSBURG

CHILTON  
 CHOCTAW  
 CLANTON  
 CLARKE  
 CLAY  
 CLEBURNE  
 COFFEE  
 COLBERT  
 CONECUH  
 COOSA  
 CORDOVA  
 COVINGTON  
 CRENSHAW  
 CULLMAN  
 CULLMAN  
 DADEVILLE  
 DALE  
 DALEVILLE  
 DALLAS  
 DE KALB  
 DECATUR  
 DEMOPOLIS  
 DOTHAN  
 E BREWTON  
 ELBA  
 ELMORE  
 ENTERPRISE  
 ESCAMBIA  
 ETOWAH  
 EUFAULA  
 EUTAW  
 EVERGREEN  
 FAIRFAX  
 FAIRFIELD  
 FAIRHOPE  
 FAYETTE  
 FAYETTE

TABLE CODE	ARGUMENT	FUNCTION	TABLE CODE	ARGUMENT	FUNCTION
01			02	045	SLFR PLNT
01	F	FEDERAL GOV	02	046	PRCSS CHANGE
01	L	LOCAL GOV	02	047	VAPOR RECOVERY SYS
01	P	PRIVATE	02	048	ACTVTD CRBN ADSRPTN
01	S	STATE GOV	02	049	LIQUID FLTRTN SYS
01	U	UTILITY	02	050	PACKED-GAS ABSRPTN CLMN
02			02	051	TRAY-TYPE GAS ABSRPTN CLMN
02	000	NO EQUIP	02	052	SPRAY TOWER
02	001	WET SCRUBBR HI EFF	02	053	VENTURI SCRUBBER
02	002	WET SCRUBBR MED EFF	03		
02	003	WET SCRUBBR LO EFF	03	B	BOILER
02	004	GRAV CLLCTR HI EFF	03	C	OTHR CMBSTN
02	005	GRAV CLLCTR MED EFF	03	P	PROCESS
02	006	GRAV CLLCTR LO EFF	03	S	SLD WASTE
02	007	CNTRFGL CLLCTR HI EFF	04		
02	008	CNTRFGL CLLCTR MED EFF	04	0	<10% URBN
02	009	CNTRFGL CLLCTR LO EFF	04	1	10-20% URBN
02	010	ELCTRSTC PRCPTR HI EFF	04	2	20-30% URBN
02	011	ELCTRSTC PRCPTR MED EFF	04	3	30-40% URBN
02	012	ELCTRSTC PRCPTR LO EFF	04	4	40-50% URBN
02	013	GAS SCRUBBR	04	5	50-60% URBN
02	014	MIST ELMNTR HI VEL	04	6	60-70% URBN
02	015	MIST ELMNTR LO VEL	04	7	70-80% URBN
02	016	FABRIC FLTR HI TEMP	04	8	80-90% URBN
02	017	FABRIC FLTR MED TEMP	04	9	>90% URBN
02	018	FABRIC FLTR LO TEMP	05		
02	019	CTLYTC AFTRBRNR	05	001	AL + TOMBIG
02	020	CTLYTC AFTRBRNR EXCHNGR	05	002	PHNIX CTY
02	021	DRCT FLME AFTRBRNR	05	003	E AL
02	022	DRCT FLME AFTRBRNR EXCHNGR	05	004	METRO BHAM
02	023	FLARING	05	005	MOBILE
02	039	CTLYTC OXDTN FLUE GAS DSLFR	05	006	SE AL
02	040	ALKLED ALUMINA	05	007	TN RVR VLLY
02	041	DRY LMSINE INJCTN			
02	042	WET LMSINE INJCTN			
02	043	H2SO4 PLNT CNTCT PRCSS			
02	044	H2SO4 PLNT DBL CNTCT PRCSS			

TABLE CODE	ARGUMENT	FUNCTION			
06	2740	PHENIX CITY	06	3380	WALKER
06	2760	PICKENS	06	3390	WARRIOR
06	2780	PIEDMONT	06	3400	WASHINGTON
06	2800	PIKE	06	3425	W END-COBB TWN
06	2820	PLEASANT GROVE	06	3440	WETUMPKA
06	2840	PRATTVILLE	06	3460	WILCOX
06	2860	PRICHARD	06	3480	WINFIELD
06	2870	RAINBOW	06	3500	WINSTON
06	2880	RANDOLPH	06	3520	YORK
06	2900	ROANOKE			
06	2910	ROOSEVELT			
06	2920	RUSSELL			
06	2940	RUSSELLVILLE			
06	2960	ST CLAIR			
06	2980	SARALAND			
06	3000	SCOTTSBORO			
06	3020	SELMA			
06	3040	SHEFFIELD			
06	3060	SHELBY			
06	3080	SUMTER			
06	3100	SYLACAUGA			
06	3120	TALLADEGA			
06	3140	TALLADEGA			
06	3160	TALLAPOOSA			
06	3180	TALLASSEE			
06	3200	TARRANT CITY			
06	3220	THOMASVILLE			
06	3240	TROY			
06	3260	TRUSSVILLE			
06	3280	TUSCALOOSA			
06	3300	TUSCALOOSA			
06	3320	TUSCUMBIA			
06	3330	TUSKEGEE			
06	3340	UNION SPRINGS			
06	3360	VESTAVIA HILLS			

APPENDIX D  
Computer Center Billing Algorithm

## COMPUTER CENTER BILLING ALGORITHM

The calculations of Run CFU's are developed by the 1100 Series Operating System when the Run is processed. The number of CFU's, together with supporting statistics, are printed at the end of each Run listing. The formula used is as follows:

$$\text{BATCH} \quad \text{Base CFU's} = \text{CPU} * 1.1 + \text{CTSU's} + \frac{\#I/O}{225}$$

$$\text{Where} \quad \text{CTSU} = \left( \text{CPU} + \frac{I/O * 27\text{ms} + \text{Words Transferred}}{80000} \right)$$

$$\frac{* \# \text{CORE BLOCKS}}{110}$$

$$\text{DEMAND} \quad \text{Base CFU's are Base Batch CFU's multiplied by 3, i.e. a 200\% increment.}$$

For on-site work, including local accounts that due to proximity could have their work done on-site without incurring long distance phone line charges, the calculation of CFU's will include the following:

$$+ \frac{\# \text{CDs In}}{500} + \frac{\# \text{CDs Out}}{35} + \frac{\# \text{Print Lines}}{200}$$

When applicable, Base CFU's are modified by the following increments and decrements:

### Increments:

1. Each 50 Tracks, or fraction thereof, over 400 tracks of temporary storage used during the processing of a Batch Run, or over 200 tracks in the case of a Demand Run, will cause an incrementation of one percent (1%).
2. For Batch Run there will be an increment of fifteen percent (15%) for each servo above three (3) in use at any one time.



3. For Demand Runs there will be an increment of fifteen percent (15%) if one (1) servo is used and an increment of fifty percent (50%) if two (2) are used at any one time. A Demand Run will not be allowed to use over two (2) servos.
4. For each Priority Level above the system standard on Batch Runs, there will be a nine percent (9%) increment.

Decrements: Shift Differentials

1. The Run CFU's are dynamically decremented by fifteen percent (15%) if the Run is started on the scheduled second shift.
2. The Run CFU's are dynamically decremented by thirty percent (30%) if the Run is started on the scheduled third shift.
3. The Run CFU's are dynamically decremented by thirty percent (30%) for runs processed during a scheduled Saturday shift.

Final CFU's are the appropriately modified Base CFU's, which up to this point have been calculated with all elements carried to three (3) decimal points, rounded up by .500.

Minimum Run Charge = 10 CFU's.

APPENDIX E  
Typical Inquiries

Question: List all facilities and their addresses in the data base by region - county.

Inquiry:

FILE CONTAINS 7269 RECORDS  
QUERY SELECTED 266 RECORDS

Q,SEARCH=1,AGNCY P.  
P,FULL,RGN=CNTY,RGN=CNTY L,FCLTY,FCLTY-NM,FCLTY=CTY,FCLTY-DSCRIPT,  
SIC.

Response:

	RGN=CNTY	RGN=CNTY	FCLTY	FCLTY=NAME	FCLTY CITY	FCLTY DESCRIPTION	SIC
<b>T</b>	101	CHOCTAW	1	AMERICAN CAN COMPANY	NAHEOLA	KRAFT PULP MANUFACTURE	2621
	101	CHOCTAW	2	PRUE + HUGHES COMPANY	WOMACK HILL, AL	SWEET GAS OPERATION	1311
	101	CHOCTAW	6	ERGON INC.	WOMACK HILL	CRUDE OIL STORAGE	
	101	CHOCTAW	7	HUNT OIL COMPANY	MELVIN AL	PETROLEUM STORAGE-PUMPING	
	102	CLARKE	1	ALLIED PAPER INC.	JACKSON	KRAFT PULP MANUFACTURE	2621
	104	DALLAS	1	ALABAMA METALLURGICAL CO.	SELMA	PRODUCING FERROSILICONS	
	104	DALLAS	2	DALLAS ASPHALT INC	SELMA	ROTARY DRYER	2951
	104	DALLAS	3	HAMMERMILL PAPER COMPANY	SELMA	KRAFT PULP MANUFACTURE	2611
	104	DALLAS	7	ASPHALT ENGINEERS INC	SELMA 36701	ROTARY DRYER	2951
	104	DALLAS	8	GENERAL BATTERY+CERAMIC			
	104	DALLAS	9	DALLAS ASPHALT INC	SELMA	ASPHALT PLANT	
	104	DALLAS	10	ALL-LOCK CO OF ALABAMA	SELMA	ZINC CASTING MFG	3369
	105	MARENGO	1	GULF STATES PAPER CORP.	DEMOPOLIS	KRAFT PULP MANUFACTURE	2621
	105	MARENGO	2	LONE STAR INDUSTRIES INC.	DEMOPOLIS	MFR. OF PORTLAND CEMENT	3241
	105	MARENGO	2				
	105	MARENGO	4	ALABAMA POWER CO	DEMOPOLIS	ELEC.POWER PLANT	4911
	106	MONROE	1	CLAIBORNE LIME PLANT	CLAIBORNE	AGRICULTURAL LIME PRO.	3281
	106	MONROE	4	OLINKRAFT INC.	MONROEVILLE	PARTICLEBOARD PLANT	2499
	106	MONROE	5	ARVIN INDUSTRIES, INC.	MONROEVILLE		
	106	MONROE	6	VANITY FAIR MILLS, INC.	MONROEVILLE, AL	OPEN BURNING F---	
	106	MONROE	7	DIXIE ASPHALT			

Question: Determine the status of all periodic reports (ACTN= 13).

Inquiry:

FILE CONTAINS 2001 RECORDS  
QUERY SELECTED 519 RECORDS

Q,ACTN EQ 13.

P,FULL,FCLTY,FCLTY-NM,FCLTY-CTY,SCHDLD,PRFRMD.

Response:

FCLTY	FCLTY-NAME	FCLTY CITY	SCHDLD	PRFRMD
1	ALLIED PAPER INC.	JACKSON	730931	730931
1	ALLIED PAPER INC.	JACKSON	730630	730630
1	ALLIED PAPER INC.	JACKSON	740701	
1	ALLIED PAPER INC.	JACKSON	740630	740630
1	ALLIED PAPER INC.	JACKSON	740401	740331
1	ALLIED PAPER INC.	JACKSON	730630	730630
1	ALLIED PAPER INC.	JACKSON	731231	731231
1	ALLIED PAPER INC.	JACKSON	730931	730931
1	ALABAMA METALLURGICAL CO.	SELMA		730629
1	ALABAMA METALLURGICAL CO.	SELMA	730930	731009
1	ALABAMA METALLURGICAL CO.	SELMA		731009
1	ALABAMA METALLURGICAL CO.	SELMA	740930	
1	ALABAMA METALLURGICAL CO.	SELMA	750101	
1	ALABAMA METALLURGICAL CO.	SELMA		730330
1	ALABAMA METALLURGICAL CO.	SELMA		730629
1	ALABAMA METALLURGICAL CO.	SELMA		731009
1	ALABAMA METALLURGICAL CO.	SELMA	731214	731231
1	ALABAMA METALLURGICAL CO.	SELMA	731231	731230
1	ALABAMA METALLURGICAL CO.	SELMA	740331	740331
1	ALABAMA METALLURGICAL CO.	SELMA	740630	740703
3	HAMMERMILL PAPER COMPANY	SELMA	741231	
3	HAMMERMILL PAPER COMPANY	SELMA	740931	
2	...	...	731231	

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Question: Generate a frequency distribution of all the actions performed by the AAPCC during the fourth quarter of 1974.

Inquiry:

FILE CONTAINS 2691 RECORDS  
QUERY SELECTED 394 RECORDS

Q,PYM GE '7410' AND LE '7412'.  
S,ACTN A.  
C,ACTN,U,SNR=ACT = COUNT ACTN.  
P,SM,ACTN L,SNR=ACT.

Response:

ACTN	NR=ACT
INSPECTION	63
PLAN SUBMISSION	5
PLAN REVIEW	13
REV W/SOURCE	65
CONTRTS AWARDED	4
CUMP CONST/MOD	8
COMPLETE COMPL	34
SOURCE TESTING	2
AQ SURVEY	1
PERIODIC REPORT	14
COMPLAINT	18
OTHER	7
ISSUE COND PRMT	18
ISSUE QONS PRMT	1
ISSUE TEMP PRMT	8
ISSUE OPRN PRMT	25
PRMT EXPIRATION	1
VIS EMIS READIN	5
VARNCE PER BEGINS	3
VARNCE PER EXPIRE	3

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Question: Generate a frequency distribution by staff member of all the actions performed during 1974.

Inquiry:

FILE CONTAINS 7269 RECORDS  
QUERY SELECTED 2006 RECORDS

Q,PYM GE '74Q1' AND LE '7412'.  
S,STAFF A,ACTN A.  
C,ACTN,Q,SNR=ACT = COUNT ACTN.  
P,SM,STAFF L,ACTN L,SNR=ACT.

Response:

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STAFF	ACTN	NR=ACT
	ISSUE COND PRMT	1
OWEN	AQ SURVEY	1
SMITH	COMPLETE COMPL	5
SMITH	AQ SURVEY	1
SMITH	PERIODIC REPORT	1
SMITH	ISSUE OPRN PRMT	5
SHOOKMAN	FIELD PATROL	52
BRYANT	INIT CONST/MOD	1
BRYANT	COMPLETE COMPL	2
BRYANT	PERIODIC REPORT	28
BRYANT	COMPLAINT	1
BRYANT	ISSUE COND PRMT	3
BRYANT	ISSUE CONS PRMT	4
BRYANT	ISSUE TEMP PRMT	3
ROBERTSON	INSPECTION	5
ROBERTSON	CONTRTS AWARDED	1
ROBERTSON	COMP CONST/MOD	9
ROBERTSON	COMPLETE COMPL	9
ROBERTSON	PERIODIC REPORT	14
ROBERTSON	OTHER	3
ROBERTSON	ISSUE CONS PRMT	1
ROBERTSON	ISSUE OPRN PRMT	2
ROBERTSON	REGIN OPERATION	1

Question: Located all emission  
points in Jefferson County  
and print their location  
and estimated emissions.

# Inquiry:

4,SEARCH=3,CNTY1 P,  
C,CNTY1,\$TOTP = SUM EMSSN-PART  
C,CNTY1,\$TOTS = SUM EMSSN-SO2  
C,CNTY1,\$TOTN = SUM EMSSN-NOX  
C,CNTY1,\$TOTH = SUM EMSSN-HC  
C,CNTY1,\$TOTC = SUM EMSSN-CO  
F,FULL,CNTY1 L,PLANT=NM,PLANT=ID,PNT,EMSSN-PART,EMSSN-SO2,  
EMSSN-NOX,EMSSN-HC,EMSSN-CO;\$TOTP,\$TOTS,\$TOTN,\$TOTH,\$TOTC.

## Response:

PAGE 1

COUNTY	PLANT NAME AND ADDRESS	PLANT POINT	EMSSN EST PART	EMSSN EST SO2	EMSSN EST NOX	EMSSN EST HC
EMSSN EST CO						
TOTP	TOTS	TOTN	TOTH	TOTC		
ETOWAH	ALA.POWER GADSDEN. GOODYEAR AVE. GADSDEN	0002 01	1800	2486	1444	12
30						
ETOWAH	ALA.POWER GADSDEN. GOODYEAR AVE. GADSDEN	0002 02	1800	2486	1444	12
30						
ETOWAH	SOUTHEAST CONT PULOX 21230 BISHAM ALA	0004 01	-0	-0	-0	-0
-0						
ETOWAH	CALHOUN ASPHALT CO PO BOX 1840. 35402	0005 01	2	0	-0	-0
-0						
ETOWAH	REPUBLIC STEEL 174 S 26TH ST GADSDEN	0008 01	383	0	-0	-0
-0						
ETOWAH	REPUBLIC STEEL 174 S 26TH ST GADSDEN	0008 02	416	611	-0	-0
-0						
ETOWAH	REPUBLIC STEEL 174 S 26TH ST GADSDEN	0008 03	519	728	-0	-0
-0						
ETOWAH	REPUBLIC STEEL 174 S 26TH ST GADSDEN	0008 04	174	0	-0	-0
-0						
ETOWAH	REPUBLIC STEEL 174 S 26TH ST GADSDEN	0008 05	2657	428	-0	-0
-0						
ETOWAH	REPUBLIC STEEL 174 S 26TH ST GADSDEN	0008 06	69	0	-0	-0

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Question: Compute emissions by county.

Inquiry:

FILE CONTAINS 983 RECORDS  
QUERY SELECTED 321 RECORDS

Q,SEARCH=3,CNTY1 EQ '1980'  
P,FULL,AQCR1,YR1,PLNT-ID,PLNT=NH,UTM,HRZNTL,VRTL,EMSSN=SO2,  
EMSSN=PART

Response:

AQCR	YEAR	PLANT	PLANT NAME AND ADDRESS	UTM	EW	COORD	NS	COORD	EMSSN	EST	SO2	EMSSN	EST	PART
STACK	FLOW	RATE	STACK	TEMP										
004	71	0215	MARTIN-MARIETTA CEMENT 2800 N. 24TH ST.	16	516.7	3712.0			0				18	
004	71	0215	MARTIN-MARIETTA CEMENT 2800 N. 24TH ST.	16	516.7	3712.0			0				1	
004	71	0215	MARTIN-MARIETTA CEMENT 2800 N. 24TH ST.	16	516.7	3712.0			0				1	
004	71	0215	MARTIN-MARIETTA CEMENT 2800 N. 24TH ST.	16					0				-0	
004	71	0215	MARTIN-MARIETTA CEMENT 2800 N. 24TH ST.	16					0				-0	
004	71	0220	MCWANE CAST IRON PIPE 1201 VANDERBILT RD	16	519.4	3710.7			0				12	
004	71	0220	MCWANE CAST IRON PIPE 1201 VANDERBILT RD	16	519.4	3710.7			0				16	
004	71	0220	MCWANE CAST IRON PIPE 1201 VANDERBILT RD	16	519.4	3710.7			0				0	
004	71	0225	MILLER FOUNDRY 78 E. LUVICK ALTON RD. B:HM	16	536.0	3713.0			0				22	
004	71	0228	NATIONAL TIRE SALVAGE 2900 21ST AVE N.	16					0				1991	
004	71	0229	BRISTOL STEEL IRON WORKS 2100N-18TH BESS	16	502.5	3697.3			0				-0	
004	71	0229	BRISTOL STEEL IRON WORKS 2100N-18TH BESS	16	502.5	3697.3			0				2	
004	71	0229	BRISTOL STEEL IRON WORKS 2100N-18TH BESS	16	502.5	3697.3			0				-0	
004	71	0230	PULLMAN STANDARD	16	519.4	3710.7			0				-0	
004	71	0232	PAN NATL FENCE MFG 1621 NEW CASTLE	16	518.9	3718.5			0				13	
004	71	0240	REPUBLIC STEEL BIRMINGHAM 35214	16	512.7	3709.1			32				0	
004	71	0240	REPUBLIC STEEL BIRMINGHAM 35214	16	512.7	3709.1			735				555	
004	71	0240	REPUBLIC STEEL BIRMINGHAM 35214	16	512.7	3709.1			59				1	
									3709.1				59	



ORIGINAL PAGE IS  
OF POOR QUALITY

Question: Select all Jefferson  
County point source and  
convert the data for  
imprint to the Air Quality  
Display Model.

Inquiry:

FILE CONTAINS 4915 RECORDS  
QUERY SELECTED 559 RECORDS

Q,SEARCH=3,CNTY: EQ '1980'.  
C,ALL,3,\$HT = STCK-HT \* 0.3048  
C,ALL,3,\$DIA = STCK-DIA \* 0.3048  
C,ALL,3,STEMP = 0.5556 \* (STCK-TEMP + 459.67)  
C,NONE,2,\$SO2 = SUM EMSSN-SO2  
C,NONE,2,\$PART = SUM EMSSN-PART  
P,FULL,YR1,PLNT-ID,PLNT-NM,UTH,HRZNTL,VRTL,  
EMSSN-SO2,EMSSN-PART:\$HT,\$DIA,STCK-FLOW,STEMP,  
STCK-HT,STCK-DIA,STCK-TEMP,\$SO2,\$PART

Response:

PAGE 3

YEAR	PLANT	HT	PLANT NAME AND ADDRESS	UTH EW COORD	NS COORD	EMSSN EST	SO2	EMSSN EST	PART
STACK	HT	STACK	DIA	STACK	FLOW RATE	TEMP			
73	0030	ACIPCO	2930 16TH ST	35207	16	515.2	3711.7	0	32
	-0	-0	.000		-0			255.392	
73	0030	ACIPCO	2930 16TH ST	35207	16	515.2	3711.7	0	232
	-0	-0	.000		-0			255.392	
73	0030	ACIPCO	2930 16TH ST	35207	16	515.2	3711.7	-0	-0
	63	20	19.202		77590			299.840	
73	0030	ACIPCO	2930 16TH ST	35207	16	515.2	3711.7	0	3
	-0	-0	.000		-0			294.284	
73	0030	ACIPCO	2930 16TH ST	35207	16	515.2	3711.7	0	63
	60	33	18.288		54000			299.840	
73	0030	ACIPCO	2930 16TH ST	35207	16	515.2	3711.7	0	72
	60	26	18.288		16000			299.840	
73	0030	ACIPCO	2930 16TH ST	35207	16	515.2	3711.7	0	78
	60	30	18.288		-0			255.392	
73	0030	ACIPCO	2930 16TH ST	35207	16	515.2	3711.7	0	144
	59	30	17.983		46000			299.840	
73	0030	ACIPCO	2930 16TH ST	35207	16	515.2	3711.7	0	117
	-0	-0	.000		-0			294.284	
73	0030	ACIPCO	2930 16TH ST	35207	16	515.2	3711.7	0	684
	60	70	18.288		88301			866.552	
73	0030	ACIPCO	2930 16TH ST	35207	16	515.2	3711.7	0	684
	60	70	18.288		88301			866.552	

The following is a sample page from the Monthly Activity Report which is available to organizations within the state. This report summarizes the actions performed against companies on a monthly basis.

RGN-CNTY	ACTN	PRFRMD	FCLTY-NAME FCLTY ADDR FCLTY CITY	FCLTY PRMT EMISSION POINT
COLBERT	PUBLIC HEARING	741119	REYNOLDS METALS CO EAST SECOND ST LISTERHILL	8 W001
COLBERT	ISSUE COND PRMT	741121	REYNOLDS METALS CO EAST SECOND ST LISTERHILL	SUB ELECTRIC ARG SIL FURN 8 W001
COLBERT	PUBLIC HEARING	741119	REYNOLDS METALS CO EAST SECOND ST LISTERHILL	SUB ELECTRIC ARG SIL FURN 8 W013
COLBERT	ISSUE COND PRMT	741121	REYNOLDS METALS CO EAST SECOND ST LISTERHILL	POTROOM SCRUB SLURRY KILN 8 W013
COLBERT	OTHER	741121	USS AGRIC-CHEMICALS P.O. BOX 250 CHEROKEE	POTROOM SCRUB SLURRY KILN 13 A000
JACKSON	INSPECTION	741106	BARRETT+LEWIS LIMESTONECO REILY ROAD SCOTTSBORO	1 A000
JACKSON	COMPLETE COMPL	741107	BARRETT+LEWIS LIMESTONECO REILY ROAD SCOTTSBORO	1 A000
JACKSON	INSPECTION	741106	VULCAN MTLs-SE DIV BOX 854 SCOTTSBORO	5 A000
JACKSON	INSPECTION	741106	WARREN BROTHERS CO. ROUTE 2	6 A000